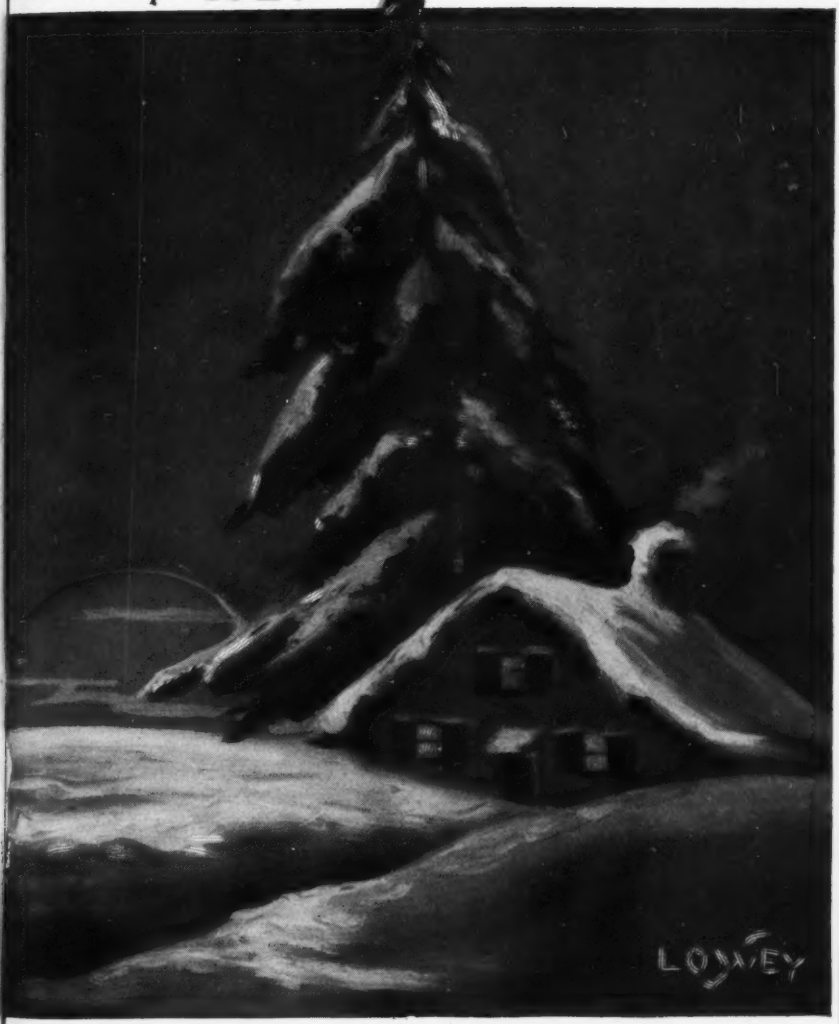
Better Crops

The Pocket Book of Agriculture

February 1927 10 Cents



his time: Mind — Up-to-date — A Burning Question — Cali-
rnia — P. L. Johnson, Gold Medal Farmer — Ten Years Old

No Potash

Potash

Easy Picking

SMALL, poorly developed cotton bolls with burs barely opened make hard, slow picking. Your labor cost goes up. Your yield—and income—are less.

Can anything be done to prevent this? Yes! In many cases it is due to potash hunger. With plenty of potash in your fertilizer, you are more likely to get large, healthy bolls with burs well opened and loose—fluffy cotton *easy to pick.*

In addition to this saving of labor you will find that a generous supply of potash helps to prevent rust and to increase your yield per acre and lower the production cost per pound.

COTTON fertilizers that are very popular and have given good results contain from 3% to 6% potash, depending on type and condition of soil. *Potash pays!*

FREE—Lots of useful information on fertilizing cotton for more profit is contained in our booklet "Better Cotton." Write now for your free copy.

POTASH IMPORTING CORPORATION OF AMERICA
10 BRIDGE STREET DEPT. B.C. NEW YORK, N. Y.

Genuine German
POTASH

Better Crops

The Pocket Book of Agriculture

The Whole Truth—Not Selected Truth

VOLUME VII NUMBER SIX

Table of Contents for February, 1927

Mind 3
Jeff says it is all supreme

Wisdom + Fertilizer = Better Cotton 5
C. B. Williams works this formula out for us

Just Received! A Forecast Nineteen Years Old 7
Some interesting information dug up by O. B. Martin

Up-to-date 9
T. S. Nored, practical farmer talks

Bringing Farm Boys Back to School 10
M. D. Mobley tells how he does it

A Burning Question 12
A timely topic discussed by A. B. Beaumont

The Hoosier Marketing Special 15
A unique way of demonstrating reported by F. C. Gaylord

California 16
No. 10 of our series, by E. D. Merrill

P. L. Johnson—Gold Medal Farmer 19
J. C. Allen describes his activities

My Apples—1926 21
Wm. L. Reed reports his progress

The Business of Community Growth 23
An interesting development related by W. L. Wilkinson

Bergstrom Teaches Fertilizer's Value 24
Guy A. Peterson's observations in the State of Washington

Ten Years Old 28
An anniversary to be celebrated, according to Paul W. Chapman

Who's Who of BETTER CROPS

EDITOR ..... R. H. STINCHFIELD
CONTRIBUTING EDITOR ..... JEFF MCDERMID
MANAGING EDITOR ..... G. J. CALLISTER
PRESIDENT ..... E. K. HOWE
VICE-PRESIDENT AND TREASURER ..... H. A. FORBES

EDITORIAL OFFICE: 10 *Bridge Street, New York*

The Village Blacksmith—once so familiar is becoming more and more a figure of the past

PUBLISHED MONTHLY BY THE BETTER CROPS PUBLISHING CORPORATION, A SUBSIDIARY OF THE POTASH IMPORTING CORPORATION OF AMERICA, 10 BRIDGE STREET, NEW YORK. SUBSCRIPTION, $1.00 PER YEAR; 10c PER COPY. COPYRIGHT, 1926, BY THE BETTER CROPS PUBLISHING CORPORATION, NEW YORK.

VOL. VII NEW YORK, FEBRUARY, 1927 No. 6

¶ *This time Jeff starts at the top where the mind is—or should be*

MIND

By

Jeff McDermid

LAST night I heard the world's champion heavy-weight, Gene Tunney, deliver a little talk from the rostrum of a vaudeville theater in Minneapolis.

From the vantage point of a front row seat I listened—and studied—this crafty student. For that is what he is: a crafty student. He is a brain-worker in a field dominated by brawn.

And after hearing him, watching him and analyzing him, I am positive that he won a *mental* fight and not a physical encounter when he licked Dempsey. I don't mean that the blows he struck were anything but the powerful, animal punches of a trained and manly athlete. Gene is first, last and in the interim, an ideal physical specimen of manhood.

I am now convinced, however, that Dempsey was beaten before Gene's first jab landed. Dempsey's *mind* was licked before round one began. He was the unfortunate victim of a series of carefully thought out mental attacks—keen strategies tending to prove to him that at last he was to meet the invincible opponent. The final mental blow was the news that "jaunty Gene" had flown to the fight in an airplane!

Do not believe that this was a last minute decision on Gene's part. He is not the kind that leaves any important decisions to last minute chance. This final mental punch

was merely the climax of his carefully conceived and overpowering campaign to render his opponent's mind helpless.

Dempsey claimed that "he couldn't get going." Surely! His fists said *punch;* but his bewildered brain, stupefied by Gene's psychological drive, said *can't!*

Thus has Gene brought the last brawn-field up into the higher realms of mental strategy. From this point on, I prophesy, managers and fighters must give as much as, if not *more,* attention to the mental side of the game of fistiana than they have in the past to the development of physical perfection.

Fistiana is now in the rarified atmosphere of mentality; as are most of the activities of man today.

"WHERE is the great American desert?" asked the Seeker-after-knowledge.

And the Cynic, his gold teeth glittering and a malevolent gleam in his eye, answered:

"Under the hats of the American people."

In the early days of America, brawn yielded greater returns than brain. The new world more sorely needed chairs upon which it could sit than ideas to conjecture upon. The chair-maker outshone the philosopher.

But as civilization advanced in the pioneer country, brain began to seek its natural zone, and gradually rose to the top as a drop of water will ceaselessly struggle to gain the upper layer in a glass of oil.

We are now in an era of brain. Brawn is down in its proper place —the strata it has always occupied in advanced civilizations in older countries. It is now servant to brain.

Those who notice this and act accordingly meet with success. Those who cling to the old pioneer-day methods of brawn fail.

The mind is supreme. This is not Christian Science, nor Mental Healing nor any other species of cult. It is cold, hard, bare, worldly *fact.*

The mind controls. And, knowing this, how foolish we are not to concentrate our studious attention upon this marvelous something that lies just under the dandruff!

We offer noble prizes to the man who makes two blades of grass grow where but one previously grew. We read of and commend the marvelous experiments which increase the yield of cotton from four hundred to a thousand pounds per acre.

But we neglect to find ways to persuade "the great American desert"—the mind—to yield two golden nuggets of thought where but one, or *none,* grew before!

You can run water through irrigation ditches into the barren desert and the desert will bloom in chaotic splendor. The soil of the desert is rich, voluptuous and powerfully fertile. All it lacks is water to release its imprisoned goodness.

And the barren mind can be made to flower into astonishingly beautiful growths by careful irrigation. Not water-on-the-brain! I mean the irrigation of *study, thought* and *reasoning.*

It used to be believed that the weight of his brain or the size of a man's head denoted his power to think. We now know that the pea-sized brain in a head that wears a 6¼ hat may be far more powerful than the bulging brow on the leonine cranium of a "big-head." Size and weight, we now can state with certainty, have nothing to do with mental capacity.

This little cellular mass of grey cells in our skulls is the *directing* force. We sit in a chair and decide

(*Turn to page* 62)

Cotton on the N. C. Experiment Station. The rows in the center received no fertilizer, those on either side 400 lbs. per A. of a complete commercial fertilizer.

Wisdom + Fertilizer = Better Cotton

By Professor C. B. Williams

Head of Agronomy Dept., N. C. State College of Agriculture

THE value of cotton during the past two years was about 35 per cent of the total value of all crops grown in North Carolina. The welfare of our farmers is more vitally involved in the production of cotton than in any other crop in the state.

Notwithstanding the fact that farmers expend about $14,000,000 a year for commercial fertilizers in the production of cotton in this state, it is believed much improvement can yet be made in the choice of analyses for production of this crop.

North Carolina farmers have for a number of years consistently obtained larger average yields of lint per acre than farmers in other sections of the cotton belt. I think that one of the biggest factors which has contributed to this condition has been their better knowledge and judgment in the selection and use of commercial fertilizers.

The cotton farmers have learned that it pays to use high analysis fertilizers—suited to their soil. They know that the method and time of application are important factors. Each year more and more

attention is being given to the question of kind and amount of fertilizers per acre, availability of materials used and to the proper proportioning of the phosphoric acid, nitrogen and potash.

Field experiments have shown that the proportion of the above plant foods has a marked effect upon maturity of cotton, as measured by percentage of cotton open at first picking. Applications of commercial fertilizer increase the percentage of cotton open at first picking as compared to no fertilizer. This influence of fertilizers is more marked on the sandy or sandy loam soils of the Coastal Plain than on the heavier soils of the Piedmont region.

From a careful study of results obtained in these regions it is quite clear that phosphoric acid exerts a greater influence on percentage of cotton open at first picking than either nitrogen or potash. It is very important, however, to keep in mind the fact that both nitrogen and potash are very important elements and that best results are obtained only where they are supplied in the right amounts and in the right proportion with phosphoric acid.

It is assumed that since phosphoric acid hastens the opening of the cotton, it also causes the fruit to set earlier. This latter is an important factor to be taken into consideration in the use of commercial fertilizer under cotton when grown under boll weevil conditions.

It is fully realized that fertilizer manufacturers cannot, ordinarily, manufacture fertilizer for different crops, except for use on relatively wide areas. It is found that there is quite a wide variation in the requirements of analyses of fertilizers best suited for cotton grown on average soils of the Piedmont as compared with those of the Coastal Plain section. There is some variation, of course, even between the soil types of the same region and the same type in different stages of improvement. The more organic matter the soil contains of all types the less ammonia, within limits, will be required.

In the Coastal Plain section, as will be seen by Table II, the average best analyses is shown by types and for the section as a whole.

(*Turn to page* 54)

I—*Quantity of Complete Fertilizer May Influence Maturity of Cotton*

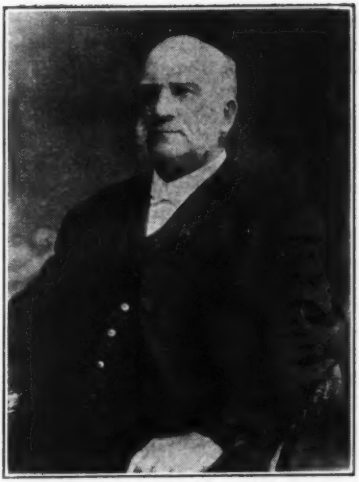
Amount of Fertilizer per Acre	Cotton Open at First Picking—Per cent
In Piedmont—Cecil Sandy Loam—Three Years	
Nothing	31
300 lbs. 7–3–2½ (PNK)	61
600 " "	51
900 " "	57
1500 " "	49
In Coastal Plain—Norfolk Fine Sandy Loam—Six Years	
Nothing	44
300 lbs. 7–3–2½	55
600 " "	62
900 " "	59
1200 " "	60
400 " 10–4–3	63
800 " "	69
1200 " "	54

Just Received!

A Forecast Nineteen Years Old

By O. B. Martin

In charge, Southern States, U. S. D. A. Extension Service



Dr. Seaman A. Knapp, who looked ahead

THE Boys' and Girls' 4-H Clubs will have a national encampment in Washington, D. C., June 16-22, 1927. Each state will be allowed to send the two boys and two girls who have done the best work and achieved the finest successes in farming and home making.

Dr. Seaman A. Knapp, who was the founder of the demonstration work, offered the first prize trip to Washington to club boys in 1909. For several years afterwards prize trips were offered in all the states where the farm and home demonstration work were being conducted. Many of the boys made more than 200 bushels of corn to the acre, and dozens of girls made profits of from $300 to $1,000 on their vegetables, fruits and poultry.

Walker Lee Dunson, of Alexander City, Alabama, made the world's record for a club member in producing 232.7 bushels of corn at a cost of 19 cents per bushel. Other club members have achieved excellent results with cotton, pigs, calves and various other commodities, so the prize winners in the Extension Service who come to Washington in June will have some high records of achievements to overcome if they are to attract such attention throughout the country and the world as was done by the pioneer club members.

About the time the club work was developing in the South, and when a few hundred boys had expressed the desire to be demonstrators and succeed as their fathers had done, the question of the educational significance of such work was attracting the attention of editors, educators and thinking people generally. Early in 1908 an editor of one of the largest magazines in the country sent out a

letter to 100 prominent men asking their opinions as to new developments in education.

Dr. Seaman A. Knapp received one of the letters. His reply, recently dug out of the files of the United States Department of Agriculture, is most interesting now. Although Dr. Knapp was laying the foundation for club work he did not hesitate to say that the most valuable development was in the education of the parents of the club members. His reply clearly indicates that his work with adults laid the best possible foundation for his work with juniors. He was proving that you can "Teach an old dog new tricks." His letter under date of April 3, 1908, was as follows:

"Allow me to submit the following reply to your inquiry:

'What new subject or new method or new direction of effort or new tendency in educational work is of most value and significance and now needs most emphasis and encouragement?

"The most important work just at present is to convey to the toiling masses of mankind whatever things of practical value genius has discovered and human experience approved and the usable knowledge scholars have acquired from any source and to present them in such a way that they will be accepted.

"There should be no limit of age to the acquisition of knowledge and no closing of the doors of opportunity to the toilers on the farm, in the workshops and in the homes. Every adult individual has a right to know and should be given such useful information as will tend to increase his comforts and add to his happiness. It is admitted that in theory one division of knowledge or one line of instruction is not more important than another, but it may become so by reason that it has been neglected or is more immediately available or more broadly applicable or touches greater sources of influence.

"Teaching of adults on the farms, in the workshops and in the homes of toil is the most valuable and significant of all the varied lines of educational work because it has in the past been the most neglected. It is the most valuable because the lessons are immediately applicable and become an investment at once for human betterment, while much of the teaching of youth is lost by indirection or lack of application. Its value is enhanced because it goes directly to the improvement of home conditions which largely fix the character of adult society and mold the rising generation.

"ADULT education is especially important at this time because increased facilities of transportation have brought the different civilizations of the world into more acute competition and national supremacy will be the reward of that people who out-think and out-work all the others. The education of adults has in it also an element of equity, because adults mainly perform the labor and bear the burdens of the world and they have a right to some of the direct and immediate benefits from what they create and support. By what law of equity can physics be taught in the public schools to the son of a mechanic, and agriculture to a farmer's boy, and the commonwealth decline to make provision for night schools for mechanics or instructions in domestic economy to the weary mother or to convey to the adult toilers on the farms what science has discovered and art devised for their assistance.

"It will be difficult, if not impossible, to fix as national characteristics those high standards of ex-

(*Turn to page* 47)

¶ Read about this man who would not get into a rut

Up-to-date

By T. S. Nored

Paris, Tennessee

THE happiest days of my life have been spent on the farm. I was raised by a father who did his own thinking, planning and experimenting. He too loved the farm and his life was devoted to a study of improving both the soil and yield of crops.

As was customary when a person stepped out of the old, time-worn ruts, to try out some new idea or modern method, some thought my father had cranky notions of farming, but as he developed these ideas and better methods of farming successfully, others gradually followed.

The methods so generally advocated today, legumes, lime, fertilizers, he was practicing when I was a barefoot boy. I have known him to plow down heavy crops of red clover in full bloom as late as May, preparing for his corn crop, when neighbors were offering him $5.00 per acre to let them mow it for hay. The result was a permanent addition to the fertility of the soil and a better yield of corn.

And as a small boy I followed the plows at laying-by time, sowing peas in the middles, which were hogged off and the residue plowed down to seed to oats, rye, or back to wheat and clover. He never cultivated more than 2 years, when it was put back to wheat and clover. He was the first man I knew in this section to lime for alfalfa, also one of the first to use commercial fertilizer, trying it out on various crops and in various ways.

I remember the first use of it on tobacco. The agent advised a teaspoonful under each hill. We used some this way, some in the drill strung from end to end of the row, some broadcast and worked into the soil. We used from a teaspoonful to the hill, up to the rate of 300 pounds per acre broadcast. Useless to say the last gave the best results.

Some of the neighbors scoffed at the idea of that stuff being any good, said it would ruin the land. Some will do this to-day, those who do not think, study, or experiment, or profit from the observation of others' experience.

I BECAME my father's partner in his work and experiments His ideas, purposes, and aims became mine also; in other words, I was trained from the cradle up to love the land, to increase its fertility, to produce larger yields than the average; trained to experiment with new crops, new methods, new machinery, new brands of fertilizers, new ideas, and to learn what

(*Turn to page 52*)

Bringing Farm Boys

By M. D. Mobley
Teacher of Vocational Agriculture, Winterville, Ga.

IN most rural communities more than 50 per cent of the farm boys between the ages of 14 and 20 years are not attending a school of any kind. Many of these boys dropped out of school before they reached the eighth grade. While our educational facilities have increased more than a hundredfold in the last 15 years, still no great effort has ever been made by our schools to reach this great mass of farm boys, who most likely will make up the future farming population.

These young men dropped out of school for various reasons, some because their labor was needed at home to help support other members of the family, while others have fallen by the wayside because they found nothing in the school curriculum of particular interest to them. However, all of them realize that they are handicapped for life because of the lack of education, and the majority of these boys are anxious to return to school if they are assured that they will be given instruction of a practical nature about the work in which they are engaged.

Unlike most secondary institutions the high school at Winterville, Georgia, accepts the responsibility of giving instruction to such boys. A short course in Agriculture and other subjects is given to them by the Vocational Agricultural Teacher during the winter months when there is very little work to be done on the farm.

In 1925 there were 14 enrolled in this class, and again in 1926 the same number, many of whom

Every boy in this picture had dropped out of school, but the teacher at Winterville brought them back

Back to School

¶ *This teacher of vocational agriculture fills up the spare time of the farm boys in his district with a regular course in agriculture.*

were the same boys who attended the previous year. They were not placed in grades, but met in a special class together where the regular standards of grading were disregarded. They only remained at school a part of the day and were called "Part-time Pupils." Some few have reached the high school, while others dropped out anywhere from the fourth through the seventh grade.

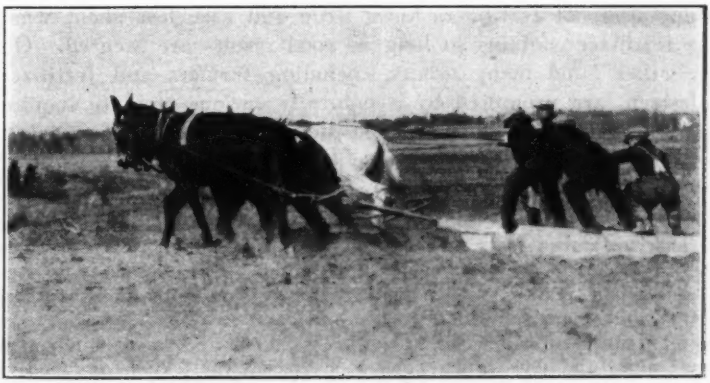
"I learned more attending the part-time class last year than any whole year I have ever attended school," said Howard Erwin, "and I believe it was due to the fact that we studied things in which I am interested."

"I realize," said Harold Hardeman, a boy who had been out of school for four years, "that I will not be able to make the same degree of success that my father has made, unless I am better educated and have more training than he. He has not had to compete with as many educated people as I will have to. This part-time course has opened my eyes, and I am planning to enter high school next September and stay until I have gotten my diploma."

Other members of the class are making plans to re-enter high school the next term. However, most of these boys will be unable to return to school for the entire year, as they are needed at home to help harvest the cotton crop in the fall, and to start the new crop in the early spring.

The course last year included "cotton production under boll weevil conditions," arithmetic, spelling, writing, and farm shop work. This year the class studied "soil improvement" with related problems, and a course in elementary

(*Turn to page* 51)



These boys are constructing terraces with a drag made by them in part-time class work

Fig. 1. Lettuce fed with optimum and excessive amounts of mineral fertilizers, salt and sugar

A Burning Question

By A. B. Beaumont

Professor of Soils, Massachusetts Agricultural College

AMONG all the materials used in agriculture there is nothing more mysterious to the average layman than fertilizers, simple or compound. Their action on plants is shrouded in mystery. They are taken on faith and used with success usually. Many users of fertilizers know little and care less about what the fertilizer contains so long as good results are secured. On the other hand many others, including farmers and fertilizer salesmen, are prompted by a naturally curious mind to inquire into the mysteries of the composition and action of fertilizers.

Many of the assumed mysteries of fertilizer are not mysterious at all if one only takes the trouble to look up known facts. Frankly there is a lot no one fully understands about fertilizers and their action, but many of the former secrets have been made clear to us. Ever since the days when bones were thought to be valuable because of the fat they contained, and soot on account of its carbon, investigators have been digging out facts and clearing up mysteries about fertilizers. Most of the ABC's have been learned, some have not. Some of the most apparently simple questions still bewilder us.

We know pretty definitely, for instance, what kind of food a plant needs and how it enters, but we know little about the best ratio of nutrients for maximum growth.

Little by little, by a fact found here and one there, painstakingly, slowly, our body of knowledge concerning fertilizers has grown. By experience and observation and by the application of science to controlled experiment, we are making headway.

The so-called burning of plants is one of the possible actions of fertilizers that has been brought prominently to the fore within the last few years. This question has become important because of the agitation for and the actual use of high-analysis fertilizers. The double--triple-, and multiple-strength mixed fertilizers and the new highly concentrated raw materials have emphasized this matter of "burn." They haven't created the problem, only focussed attention on it. The question of method of application of fertilizer has also emphasized the problem of "burn." Very localized application of small amount of fertilizer have caused "burn."

Now it happens that the simple "burning" action of fertilizers is one of the actions we understand pretty fully. It is true that it is sometimes complicated by some toxic action, but in its simple manifestations we understand it as well as we understand any of the processes connected with plant nutrition.

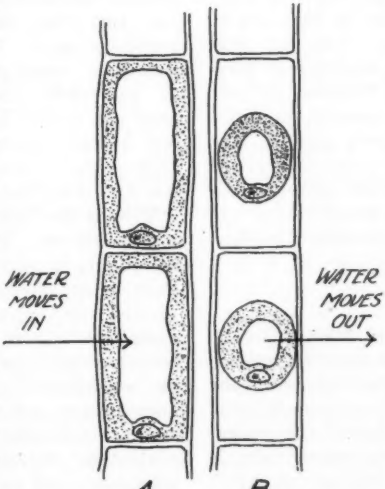


Fig. 2—Showing roothairs of maize immersed in weak (A) and strong (B) solutions of potassium nitrate, In A the cell contents are distended against the cell wall and make a firm cell. In B the cell sap has been withdrawn by the strong solution and the cell contents drawn together into a small mass; the cell is plasmolyzed.

But before "burn" is explained let us note first the general principles underlying fertilizer composition.

Fertilizer materials are valued on the basis of essential nutrients which they contain. There may be one, two or more essential elements in a single material; most materials, for example, sodium nitrate and muriate of potash, contain only one. A great variety of materials may enter into the composition of fertilizers; 57 only marks a beginning in the number of varieties. In fact one of the great advantages of the fertilizer industry in our national economy is its ability to utilize many waste, especially low grade, materials or by-products.

Now these materials that are used for their plant food content either unmixed or compounded, may vary in percentage of plant food from about 1.0 per cent to 62.0 per cent, the bulk of them carrying less than 20 per cent. What is the remainder of the substance in a material say sodium nitrate containing 15.5 per cent nitrogen? Fillers? No. It consists of about 5 per cent of impurities and sodium and oxygen which make up some 80 per cent. It is economic to get rid of the 5 per cent of impurities and the sodium and oxygen are absolutely es-

sential to fix the nitrogen. So long as we have sodium nitrate we must have the sodium and oxygen. Take cottonseed meal containing 6.0 per cent nitrogen, 2 per cent phosphoric acid, and 0.5 per cent potash, a total of 7.5 per cent plant food. The remaining 92.5 per cent consists of a small amount of impurities and carbon, hydrogen, oxygen, and small amounts of other elements inherent in cottonseed meal.

If such material be compounded into a mixed fertilizer there still will be a large amount of material other than plant food unavoidably present in the mixture. So many laymen regard this associated material as so much filler added as a make-weight or sort of adulterant by the manufacturer. As a matter of fact, in mixed fertilizer made from materials of low to medium composition there is little room left for filler in the case of fertilizer totaling 14-18 per cent plant food. The addition of filler or conditioner is, however, entirely legal and often essential in order to have the analysis correct. The essential point to note here is the fallacy of the belief, more or less prevalent, that whatever is not plant food in the fertilizer is filler.

THE amount of filler or conditioner possible in mixed fertilizer will vary considerably with the composition of the materials used. The more concentrated the materials used, the more room there is for filler in a mixture of given composition. For example, a 4-8-4 grade compounded from sodium nitrate, cottonseed meal, acid phosphate and muriate of potash with two-thirds of the nitrogen from sodium nitrate will allow only 186 pounds of filler per ton, while in a mixture of the same grade made from urea, ammonium phosphate and muriate of potash there may be 1,440 pounds of filler and conditioner. Paradoxical though it may appear, the fertilizer with the higher analysis may contain the more filler.

AS will be shown later, simple "burn" is due to water-soluble material in the fertilizer or, to be exact, to the concentration of solution in immediate contact with the roots of the plant. After all, the plant is ultimately concerned with the situation in the soil after the fertilizer has been added rather than with the contents of the fertilizer bag as such. Although there is no direct relation between analysis and amount of soluble material in mixed fertilizers, this fact should always be borne in mind. Furthermore, it should be noted that on the basis of equivalent amounts of plant food per acre it is possible to add less soluble material by using a high-analysis material instead of one less concentrated.

This is the type of injury most widely feared. In the aggregate, no doubt, it causes more trouble than injury from very toxic materials. Ordinary "burn" can be explained by the physico-chemical laws governing *diffusion*. A soluble substance dissolved in water moves from zones of strong concentration to those of weaker concentration. Diffusion of dissolved substances will take place through membranes such as those making up a plant cell wall, and always the movement is from the strong to the weak concentration. The solution present in plant cells, the so-called cell sap, is stronger than that of an ordinary soil solution;

(*Turn to page* 48)

Inside one of the lecture cars of the fruit and vegetable marketing train

The Hoosier Marketing Special

By F. C. *Gaylord*
Professor of Horticulture, Purdue University

MORE than 7,000 fruit growers, vegetable producers and business men left their farms and businesses and flocked to the scheduled stops of the country's first marketing special that operated last summer over the C. & E. I. Railroad in southern Indiana.

For a solid week this special train ran through the fruit belt of southwestern Indiana and not only gave first hand information on grading, standardization, packing, and marketing of fruits and vegetables, but also showed by actual examples how fruit and vegetables were being packed in competing territories and how they must be graded, standardized and packed to bring top prices on the leading markets of the country.

The train proper consisted of a modern refrigerator car in which all types of standard fruit and vegetable packages were found, with experts on refrigeration and packing not only showing the best manner of loading the various types of packages, but also how to load to get the best refrigeration. Here questions concerning loading, packing, bracing and refrigeration were answered.

With a temperature of over 100° F. in the shade outside, ice in the bunkers, and a sign on the door, "The coolest place in town," the

(*Turn to page* 50)

¶ *No. 10 of our series of experiment Station Series*

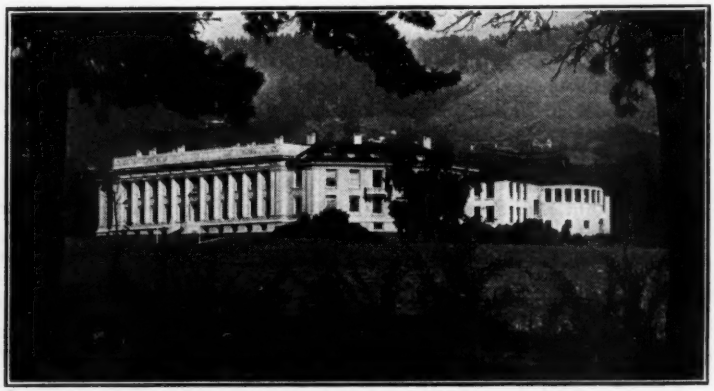
CALIFORNIA

By E. D. Merrill

Dean, College of Agriculture, University of California

THE California Agricultural Experiment Station was organized in 1875 under the leadership of Dr. E. W. Hilgard, as a part of the College of Agriculture of the University of California at Berkeley. As the station developed, and demands for special service increased, two other research centers were established, first at the University Farm, Branch of the College of Agriculture, at Davis, in the Sacramento Valley; and second, the Citrus Experiment Station at Riverside, in southern California. The University Farm was acquired in 1906 and the Citrus Experiment Station, first established in 1905, was moved to a larger site in 1916. The total land area now controlled by the station for all purposes approximates 2,500 acres.

The California Experiment Station has been developed in close cooperation with the College of Agriculture, most members of the academic staff being also members of the station staff. The work has been developed to meet the peculiarly complex agricultural conditions of California, a state in which is produced every important crop raised elsewhere in the United States, except sugar cane.



The Agricultural group—center of California's agricultural work

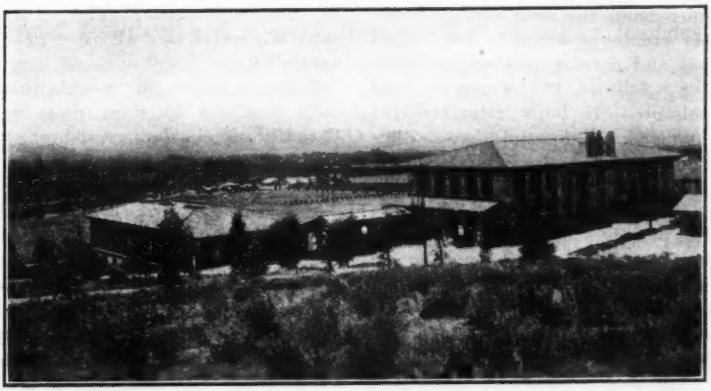
Including the numerous so-called California specialties—such crops as lemons, walnuts, almonds, prunes, apricots, artichokes, dates, figs, olives, table, wine and raisin grapes, which because of their climatic requirements can be produced in the United States only on the Western Coast—approximately 180 commercial crops are grown in California. Each special crop adds to the problems of the experiment station, so that in particular cases it has become necessary to develop crop specialists.

In addition to a technical staff covering the usual fields common to all agricultural experiment stations and colleges of agriculture, it has also become necessary in California to have specialists for intensive investigations on an additional series of problems. These include alkali reclamation, irrigation, the factors affecting perishable products during their period of transportation to distant markets, and the biological control of introduced harmful insects, this being accomplished through search in foreign fields for their parasites, and the establishment of the parasites in California.

Dr. E. W. Hilgard was Director of the California Experiment Station from 1875-1905. He was succeeded by Professor E. J. Wickson, who served until 1913, being in turn succeeded by Dr. T. F. Hunt, who retained the directorship until 1919. During the years 1919-20 the position was occupied by Dr. H. J. Webber, who was succeeded by Dr. C. M. Haring, the latter serving until June 30, 1924. The present incumbent E. D. Merrill, took over the duties of the directorship on Dr. Haring's resignation, carrying his duties as director in addition to those of Dean of the College of Agriculture

THE concrete results of the research work accomplished by the staff of the experiment station may be seen in the publications of the station. Since its organization, 402 bulletins, representing the results obtained from careful research work have been issued by the institution in such form that they could be used by the farmers of the state. During the same period over 300 circulars have been prepared, these in general being more popular in character than the bulletins.

In January, 1923, a series known as technical papers was initiated



The Citrus Experiment Station is located at Riverside

for the purpose of presenting the results of scientific research of a highly technical character. In 1925 the name of this technical series was changed to Hilgardia, a Journal of Agricultural Science, and placed on a serial basis. The new title was selected in commemoration of the first director's eminent services to California agriculture.

To-day the experiment station is an integral part of the University of California and of the life of the state. A statement of the total number of publications merely serves as an index to the activities of its staff members. While much of the success of the institution has been due to its able directors in the past, still it must be recognized that the success of the station as a whole has been due to the united efforts of its staff members. A mere recital of their most outstanding accomplishments would not convey the actual value of their achievements to the state.

For field crops in California two seasons only are to be considered; the wet or winter season, and the dry or summer season. Because crops may grow and thrive during the winter or rainy season, a high production on a relatively low annual rainfall is secured. On the other hand the long rainless summer creates a necessity for irrigation and careful methods of summer fallow to preserve soil moisture. In both irrigation and summer fallow practices, California has had the longest experience and has perfected these methods to the highest efficiency. The practices best adapted to successful culture of summer fallowed land have been largely developed through the investigations of the agronomists of the California Experiment Station.

Agronomic practices follow the necessities of the climate and because no winter killing of cereals occurs, winter varieties of wheat, oats and barleys are not favored but spring varieties are sown in the fall as is the practice for winter varieties in colder areas. Fall planting of early maturing spring varieties avoids losses from droughts which occur in April and May at the end of the growing season.

THE Division of Agronomy has introduced varieties of barley, wheat, oats, and rye which have secured greater earliness and at the same time improved the yields and quality. Better varieties and better culture have increased the yields of wheat from 14 to 21 bushels per acre. Drought resistant barleys including Club Mariout and California Mariout for the southern portion of the state and the Sacramento, and a variety resistant to lodging and shattering as well as to several cereal diseases, for the northern areas, have greatly increased barley yields. Early productive oats of high quality including such varieties as the Sunrise and the Kanota have materially favored oat production. Heileman Milo, an improved dwarf variety, has generally outyielded all other grain sorghums.

New varieties of wheats and oats resistant to stem rust and varieties of barleys resistant to barley scald and smut have been bred at the experiment station. These varieties are placed with the California Pure Seed Association to preserve their purity and to afford a constant source of good seed.

Leguminous crops, so necessary in maintaining soil fertility have been tested for both winter and

(*Turn to page* 46)

A part of the Jersey herd, 17 head of which averaged more than 317 lbs. of butterfat in 1925

P. L. *Johnson*— *Gold* Medal Farmer

By J. C. *Allen*
Purdue University, West Lafayette, Indiana

P. L. JOHNSON of Vincennes, Indiana, who produced an average yield of 123 bushels of corn per acre in the 1926 Indiana Five-Acre Corn Club, thus winning a gold medal and the honor of producing the third highest yield in the state, attributes much of his success to the use of manure from his dairy herd, commercial fertilizer and a good crop rotation including legumes.

The ten-acre field, from which his five-acre plot was selected, was very wet and unproductive when it first came into his possession, but Mr. Johnson tiled and limed it. "In the fall of 1923 we cut a crop of corn and soybeans, for silage, off this field," he said, "and sowed wheat, applying about 2½ tons of ground limestone per acre before the wheat was sown. During the following winter the field was top-dressed with 50 loads of stable manure. In the spring of 1924 two bushels of sweet clover, with a little alsike and timothy seed, were sown broadcast in the wheat.

This was a rather poor year for wheat in Indiana but this field averaged 41 bushels per acre. The young clover furnished considerable fall pasture after harvest, coming along in fine shape. During the summer of 1925 this ten-acres of sweet clover furnished more pasture than 20 head of purebred Jersey milk cows and 10 brood sows with their litters could keep down.

"In the winter of 1925-26 55 more loads of stable manure were spread on the sod and all plowed under to a depth of nine inches, in the spring, for this corn crop. We harrowed and rolled down each day all that was plowed in order to conserve the moisture and break up the clods when we could do the most good. We then broadcast, with a wheat drill, 2,000 pounds of 0-10-10 fertilizer and followed with a tractor double disc. Another disking and light harrowing put the seed bed in excellent condition.

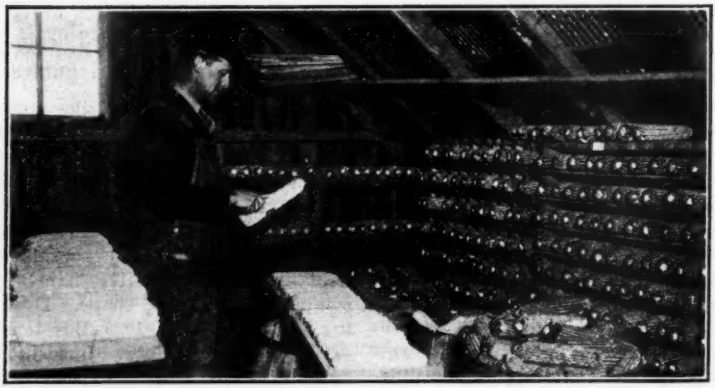
"We planted the corn 38 inches between the rows and the hills 38 inches apart, dropping two kernels to the hill and applying 75 pounds more fertilizer per acre in the hill. We used a planter attachment and dropped two soybeans in each hill of corn, which required about one bushel of beans for eight to ten acres.

"Just before the corn came up a wooden roller was run over the field to hold the moisture and level down the little ridges left by the planter, and we followed this with a rotary hoe. The first two cultivations, once each way, were deep and close to the corn, after that very shallow and farther from the rows.

"I do not believe the soybeans in the corn reduced the yield of the field of corn any, and it has been claimed that cut worms will not bother corn with beans in it. We gathered most of the standing corn in the field, in which we had our five acres this year, and then turned the hogs in to finish the corn and harvest the beans. We always put soybeans in all our corn for when in the silo we find that the beans add very much to the quality of the silage. In the fields, where we husk the corn the beans make excellent hog pasture during the late fall and winter.

"Had weather conditions been good I am sure this field would have yielded over 150 bushels per acre;" said Mr. Johnson. "Two weeks of dry weather prevailed following the planting and many of the hills did not come up until late, making the stand somewhat uneven in size; another dry spell in July caused many of the tassels to turn white and left those stalks barren; and early in October a

(*Turn to page* 59)



Mr. Johnson fertilized well for this corn yield of 123 bushels per A. After five tons of stable manure, 200 lbs. of an 0-10-10 were broadcast before planting, followed by 75 lbs. per A. in the hill at planting time

My Apples—1926

By Wm. L. Reed

Sebastopal, California

A story of surprising progress

IN reply to inquiries regarding the present condition and productiveness of my apple orchard since beginning the use of fertilizers high in phosphoric acid and potash, I am pleased to state that there has been steady and marked improvement in the trees, quality of fruit and productiveness since the first application was made in the Fall of 1923. This improvement being so marked from year to year convinces me that it would be folly for any one to expect to get maximum results from but one or two treatments.

This stands to reason, as it takes time to run down an orchard it also takes time to build it up and again get it into healthy, vigorous and full bearing condition. However looking at my orchard today —September 10, 1926—where the trees have had three consecutive treatments with fertilizers, it does not seem possible that the production could be increased still further. Trees that I thought had reached their maximum last year, produced a still heavier crop this year.

IN the Fall of 1925 my King apple trees received 35 pounds each of a fertilizer containing 10 per cent available phosphoric acid and 12 per cent potash, the potash from the sulphate of potash. This was their third treatment, the first 20 lbs. per tree of a 4-10-10, having been made in the Fall of 1923. The second treatment was 10 lbs. per tree of an 0-21-21 nitrogen in the form of chicken manure, 30 lbs. per tree, applied during the winter of 1924-5. No nitrogen was applied, in any form, this year 1925-6. One very noticeable effect, this summer, was the refusal of the trees to shed their fruit. In former years this summer drop would take fully one-half the crop.

The quality of the King apples, although excellent last year and a great improvement over that of past seasons, was still better this year, especially in color. The red and yellow markings were particularly fine. Another noticeable feature was the continued elimination of the tendency to water core, which affected many of the apples before the use of these fertilizers was begun. This year the amount of water core was negligible. The decrease in this trouble seems to indicate that it can be reduced to a minimum, if not eliminated entirely, by the proper use of fertilizers.

Although the crop was very heavy, being fully 30 per cent better in this respect than any crop these trees have produced in the past, the sizes were excellent. The trees have also put out a good healthy growth of new wood, which is firm in texture and well rounded out, quite different from the soft, spongy, brittle, and immature wood they were putting out before the use of potash was begun. The trees are also now completely free

from die-back which, formerly, was a serious matter in this orchard.

The plump, healthy condition of the fruit spurs, and an abundance of large, plump bloom buds, indicate that another bumper crop of King apples, may be looked for in 1927.

My Rome Beauty apple trees in the Fall of 1924 received an application of about 20 lbs. per tree of a fertilizer analyzing 10 per cent phosphoric acid and 12 per cent potash—this being their first treatment with commercial fertilizers. No nitrogen was used in any form. The fruit in 1925 showed a slight improvement in color, but no noticeable improvement in sizes. However, the improvement in the general condition of the trees, though small, was enough to indicate that the fertilizer was taking effect. In the Fall of 1925 each tree was given 17 pounds of a fertilizer containing 21 per cent phosphoric acid and 21 per cent potash; the latter from sulphate of potash. In addition to this, in order to supply some nitrogen, one ton of chicken manure was applied per acre.

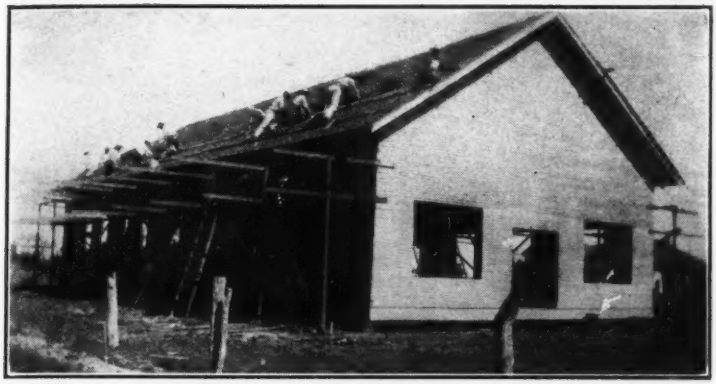
THE first week in May, 1926, while the Rome Beauties were in full bloom, this section was drenched y an 8-inch rainfall which practically wiped out this crop in the entire district. A few orchards carried a very light sprinkling of fruit, others none at all. On my place, where the trees had received this 0-21-21 fertilizer, the apples set well and will mature from a 60 to 70 per cent crop. At this date, September 10 they are large in size, of excellent color and exceptionally fine quality. The general condition of the trees is greatly improved showing an abundant growth of well developed new wood, and there is every indication that they will bear heavily next year.

Last year—1925—my Gravenstein apple trees set a light crop owing to heavy rains at blossoming time, followed by frost. All these trees had received an application of 10 lbs. per tree of an 0-21-21 fertilizer in the fall of 1924, with the exception of 60 trees on which the application was doubled. In addition all of the trees received 30 lbs. of chicken manure. The 60 trees set and matured a full crop producing, proportionately, 10 times as much fruit as obtained from the others.

In the Fall of 1925 all my Gravensteins received 17 lbs. of the same 0-21-21 fertilizer that was applied in the previous year. In addition chicken manure as a source of nitrogen was applied at the rate of one ton per acre. The crop this year—1926—was phenomenal both in quantity and quality; 15,000 lug boxes of merchantable apples were picked and delivered from 650 trees. The keeping quality and flavor were unexcelled, as attested to by those who had sampled and handled this lot of fruit, although throughout this district, the general complaint was that the Gravenstein apples were considerably below par in this respect.

Harvesting of the Gravensteins was begun July 6 and finished August 20. An examination made today—September 10—of apples that had fallen to the ground and been left lying under the trees, showed that a number of these were still in perfect condition, being crispy, firm and full of juice, with every indication that they would keep for many days longer. The superior condition in which

(*Turn to page 42*)



The shingling bee

The Business *of* Community Growth

By W. L *Wilkinson*

County Agent, Kingsville, Texas

THE one outstanding thing that enabled the people of the Riviera Community, Kleberg county, Texas, to complete a definitely planned program extending over a period of three years, was the fact that when they decided to build their much needed community house, they adopted modern business methods from the very beginning, and it was these business principles that kept the work in progress regardless of the difficulties that presented themselves.

In 1923 a committee of five, consisting of two farmers, one banker, one merchant and one doctor, was appointed to work out some method for raising the necessary money and also to adopt some plan of procedure for getting this community house built. The first thing this committee did was to form a corporation with a capital stock of $3,000. This $3,000 was divided into 300 shares of $10 each and sold, mostly, to the people living in the Riviera Community.

When in June, 1925, the building was actually started, $2,100 had been collected on these shares and there were 102 stockholders. The name of this corporation is the "Riviera Community Association". It is the purpose of this corporation to promote, foster, and encourage free lectures, studies and discussions on agriculture, politics, economics and other educational subjects in general.

It is wonderful how willing and anxious people are to assist and even make sacrifices in order to build up their community when dependable business methods are

(*Turn to page 56*)

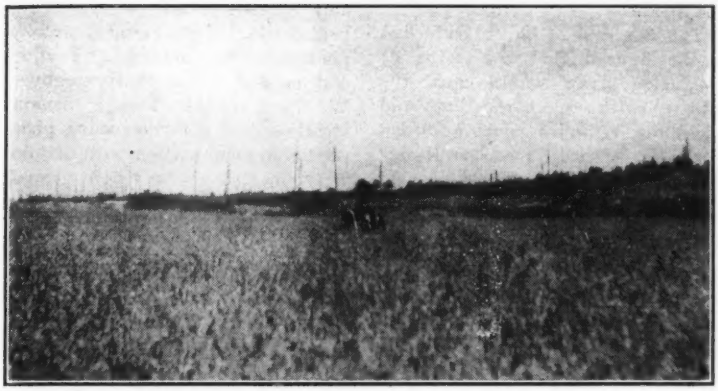
Silas Butler standing in oats that received no fertilizer. The yield was 18 *sacks per acre*

Bergstrom Teaches

By Dr. Guy A. Peterson
Madison, Wisconsin

BEFORE C. H. Bergstom became the agricultural agent in Skagit county, Washington, in 1922, but little commercial fertilizer was applied in that county. A few of the stores and feed dealers carried a small amount on hand to supply the infrequent demands from local gardeners, but aside from that, "All was quiet along the Potomac." In fact a number of the sacks of fertilizer that some enthusiastic dealer had sold to the local storekeepers years before were still in stock, though to their credit it must be said that their value on the books was still held at par at the annual inventory time.

Such was the status of affairs along fertilizer lines when Bergstrom took the helm as leader of agricultural events in that county. Today Skagit county farmers are applying commercial fertilizers at the rate of more than 800 tons a year. The yearly figures as shown by Bergstrom's figures from 1923 to 1926 are phenomenal. In 1922 the amount used was negligible as it was applied only by a few farmers who were making experiments under the county agent's direction. The results justified further purchases so the farmers in the county cautiously increased their 1923 applications to 150 tons. The next year they applied twice as much and followed it up in 1925 with 450 tons. Last year they raised the total to 750 tons which means an increase of 500 per cent in just four years.



This Field received 225 lbs. acid phosphate and 75 lbs. muriate of potash, and averaged 35 sacks per acre

Fertilizer's Value

One of the first things that the farmers asked Bergstrom to do after he arrived was to make some fertilizer demonstrations on different types of soil. Skagit county, because of its cool moist climate, is noted for its high oat yields. It is fortunate that this is so because oats and barley form the principal grain feeds for the thousands of dairy cows that form the backbone of her agricultural industry. Bergstrom made a large number of fertilizer experiments on oats, but one that is typical of many of the others on peaty soils was tried on Silas Butler's farm.

Butler applied a mixture of 225 pounds of acid phosphate and 75 pounds of muriate of potash to a small plot of ground. This was spread in the spring with a regular fertilizer attachment. The results of the first year's demonstration showed up so well that he put the mixture at the same rate of application on one-half of a 44-acre field the next year in order to see what it would do under ordinary farm management. This time he harvested the two halves of the field separately and found that the fertilizer had added 13 sacks to the acre above that threshed from the untreated half.

Since Butler is a "pencil pusher" type of farmer he sat down and figured out what it had cost him to produce this added 13 sacks of oats. He had paid $1.20 a hundred for the phosphate or a total of $2.70 an acre. The potash had cost him $1.88 which made a total of $4.58 for over 1,300 pounds of high quality grain. Since oats are figured at 36 pounds to a bushel in Washington, the $4.58 per acre fertilizer investment had produced an average increase of 36 bushels per acre on the treated part of

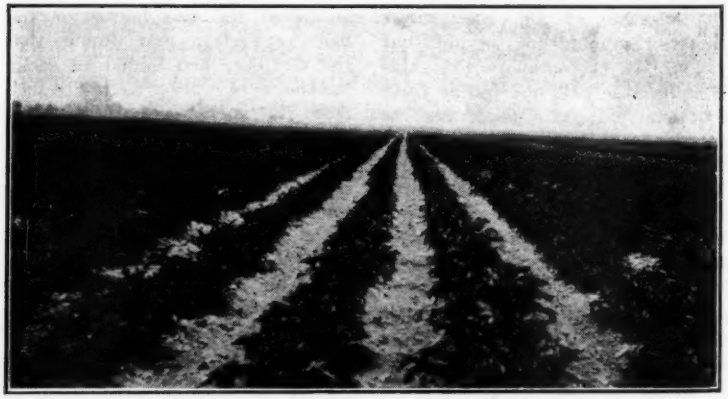
the field.

This is a cost of 12 cents a bushel as he figured that the value of the extra straw would equal the added costs of harvesting and threshing. Twelve cents a bushel for oats is cheap feed, so Butler put the mixture on the whole field the next year. Now after having oats on the same ground four years in succession he is getting 35 sacks an acre where he formerly got 18. His neighbors have seen the demonstration made before their very eyes. As a result they are taking the county agent's advice to "go and do likewise."

Bergstrom in commenting on oat yields told us, "There are fields on clay loam soils here that have grown oats for 35 to 40 years that are still producing 35 to 40 sacks an acre. Even on these soils, however, the production is beginning to fall off. We advocate superphosphate in connection with manure, and green cover crops on the upland soils with liberal amounts of potash on muck and peat lands. Many farmers put the phosphate in manure spreaders and haul it out with the manure. We have found through demonstrations that a farmer using phosphates in combination with manure can cover twice as much ground and get better results than with manure alone."

One of these demonstrations was made on Buel Streeter's farm. Ten loads of manure were applied on one acre. On another a 300 pound application of superphosphate was put on with 5 loads of manure, and to the rest of the field no treatment was given. Streeter mixed the phosphates with the manure by loading the spreader one-third full at a time and covering each third with 20 pounds of commercial fertilizer. In this way he put on 60 pounds to the load and the spreader beaters mixed it evenly, when unloading. The following results were obtained:

Treatment	*Yield in Sacks*	*Weight per Sack*
None	30	102 pounds
10 loads manure	37	103 pounds
5 loads manure and 300 pounds phosphate	37	107 pounds



Alfred Johnson's potato field where an application of 250 lbs. acid phosphate and 150 lbs. muriate of potash increased the yields 3.7 tons per A. on peat soil

Sugar beets receiving no fertilizer on peat soil failed to come up

It will be seen that the acre treated with the manure and phosphate combination produced the same number of sacks as did the one to which 10 loads of manure had been applied, but the average sack weighed 4 pounds more. In other words, the land treated with the 300 pounds of phosphates when applied with 5 loads of manure produced 148 pounds more oats from an acre than did the land treated with 10 loads of manure, and 735 pounds more than that which received no treatment. Bergstrom points out, "These results show that the farmer can make more efficient use of manure. When this method is followed, coupled with a good rotation system, it means that he can maintain or even increase his crop yields with little added cost."

Bergstrom has found some interesting results by using commercial fertilizers on clover. He said, "Reports have come in and we have found it to be true in actual demonstration that an application of acid phosphate insures a much better catch of clover. Where there has been a great deal of difficulty in securing a good stand this has been overcome by a large number of farmers through the use of this fertilizer. We have also found that it results in higher hay yields. One of these demonstrations was made on the Zeno Blank farm.

"Blank applied 300 pounds superphosphate by hand as a top dressing on red clover early in the spring. The clover had been seeded in fall wheat the previous year. The fertilizer was applied in a strip running through the center of the field and worked into the soil with a harrow. He reports a 33 per cent increase in measured yield over and above that from the untreated part."

IN cooperation with Professor F. J. Sievers of the soils department at the Washington College of Agriculture, Bergstrom has been making a study of the mineral contents of various grains and hays from fertilized and unfertilized fields. He says, "We have found by a chemical analysis of forage plants such as clover, and grain plants such as oats, that they sometimes show a deficiency in mineral content. By comparison of

(*Turn to page* 58)

TEN YEARS OLD

By Paul W. Chapman

State Director of Vocational Education, Athens, Ga.

VOCATIONAL agriculture is 10 years old. On February 23 a decade will have passed since Woodrow Wilson signed the Smith-Hughes Act.

To those of us who have been engaged in this work for the greater part of this period of years this anniversary marks an important milestone. We can't help at this time, pausing to look back and being a little reminiscent. We also feel that it is an appropriate time to look into the future and speculate on what the developments of the next 10 years will be.

The progress of the past 10 years, so far as figures are concerned, can be told in a few words.

Prior to 1917 only a few states, notably Massachusetts, New York, Indiana, Wisconsin, and one or two others, made any serious attempt to teach agriculture in a practical way in their public schools. Today vocational agriculture, with college-trained, farm-reared teachers employed for 12 months in the year, is a part of the educational program of every state in the entire country.

In 1917-18 there were 600 schools in the United States employing teachers of vocational agriculture. Today there are almost 5,000.

Ten years ago there were 16,000 persons enrolled in vocational agricultural courses. In 1926 there were 110,000, and at the present time there are approximately 125,000.

The first year that Smith-Hughes funds were available, Uncle Sam sent to the states $548,000 to help pay the salaries of teachers of vocational agriculture. Last year the federal aid for this purpose amounted to $3,027,000, in addition to approximately $500,000 which was spent in the agricultural colleges in the training of agricultural teachers. All this money, to be available, must be matched with state or local funds. Consequently the cost of this type of education is now about $7,000,000 annually.

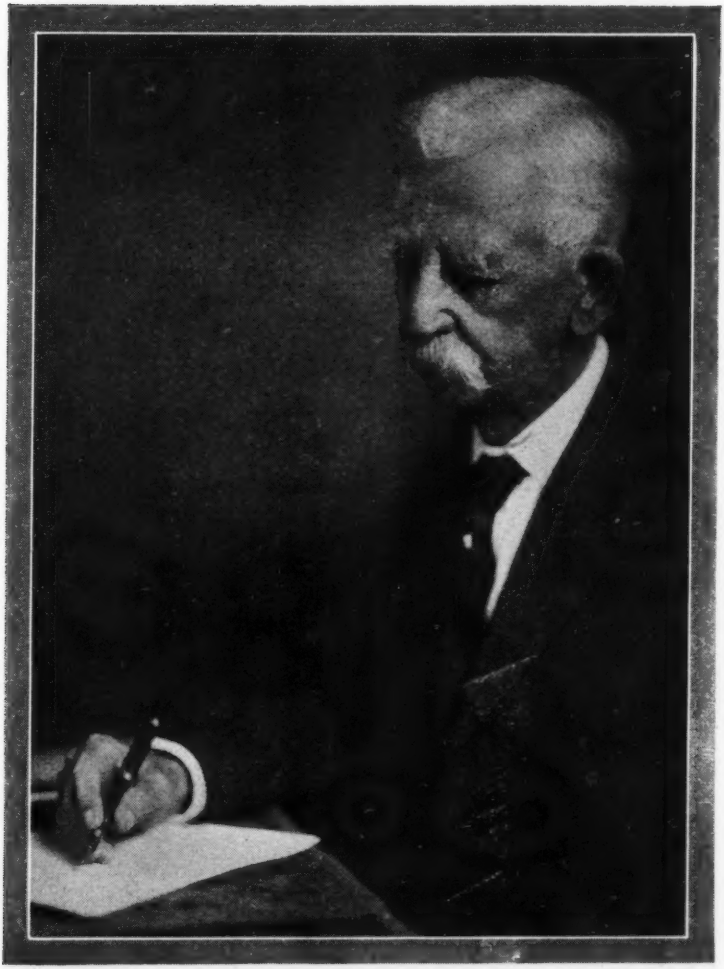
IN a brief way these figures set forth the more important facts relative to the growth of vocational agriculture from the time that the Smith-Hughes Act was passed by Congress in 1917 to the day that its tenth birthday will be observed in 1927.

But statistical information, after all, tells only an unimpressive part of any story. And the figures I have given hardly suggest what this type of education has meant to more than 3,000 rural communities.

Most of the teachers of vocational agriculture have been employed in the small town high school or in the rural consolidated school in the open country. This

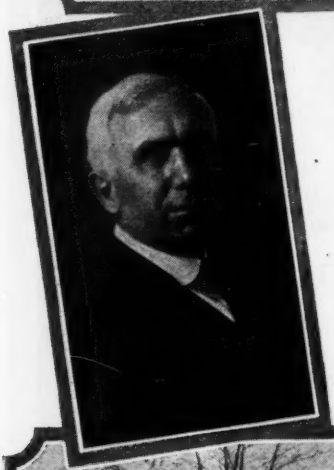
(*Turn to page* 44)

Better Crops' ART GALLERY *of the month*



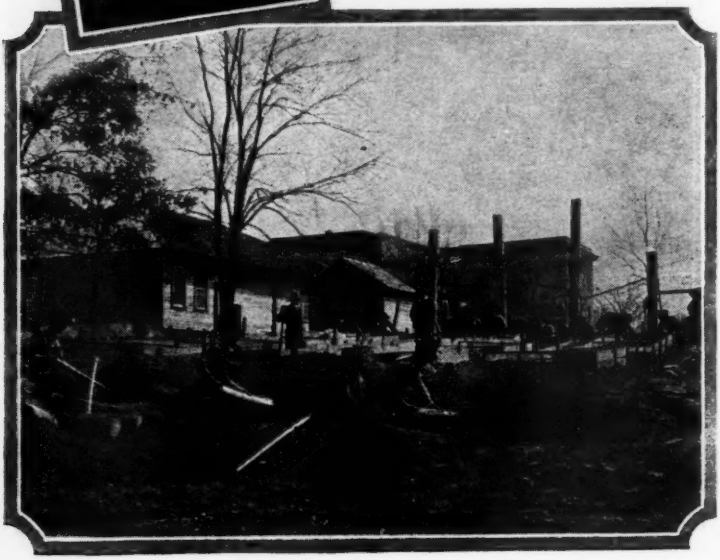
Hon. Dudley M. Hughes, Danville, Ga., holding the pen that Woodrow Wilson used in signing the Smith-Hughes Act

Georgia vocational boys setting out pine seedlings in a reforestation project under the direction of W. R. Matoon, U. S. Forestry Service



Dr. C. H. Lane, chief of the agricultural education service of the Federal Board for Vocational Education

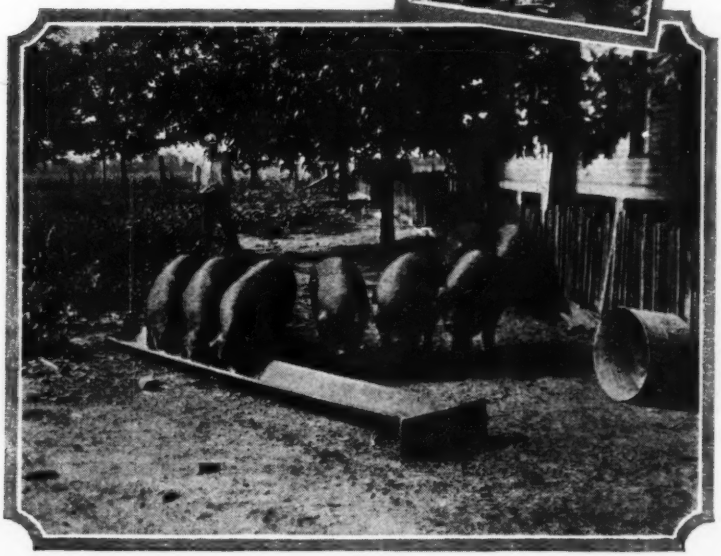
These vocational boys in Alabama are bedding sweet potatoes in a large fire-heated hot-bed.



Some of the 330 boys who attended the Junior Farmer's Week at the Georgia State College of Agriculture this year. This is an annual affair.

Charlie Martin, Donna, Texas, made $250 on cabbage during the first year that he studied vocational agriculture.

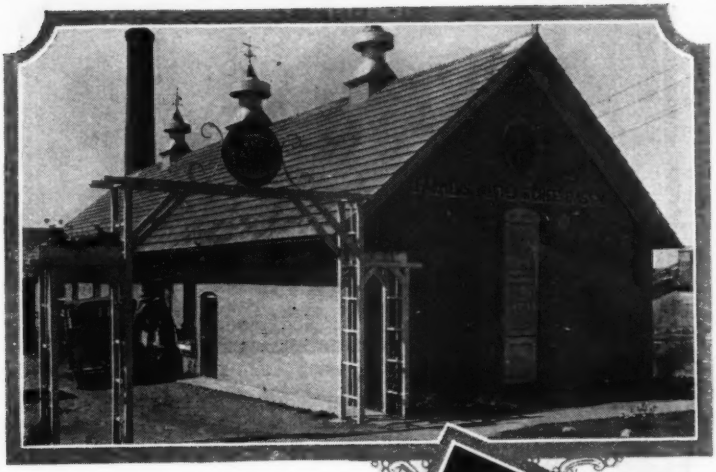
A Georgia vocational boy and his ton litter grown under the supervision of the agricultural teacher



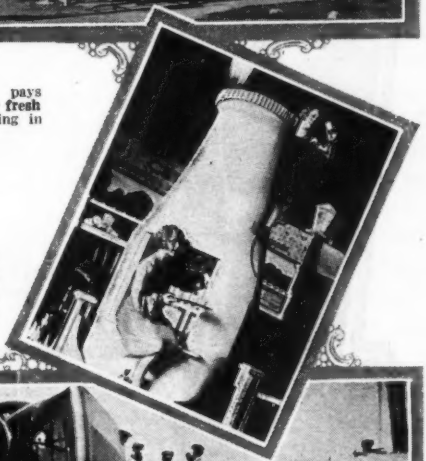
The head of a fine Rambouillet ram. It is sires like these that make sheep raising profitable for the American farmer.

Elga Daniels, youngest daughter of a tenant farmer's family of seven, was recently crowned Cotton Queen of Texas. She produced 2½ bales of staple on an acre of ground, defeating 10 boy competitors.

One of the temporary government buildings at Washington showing repairs made necessary by the attacks of termites (white ants)

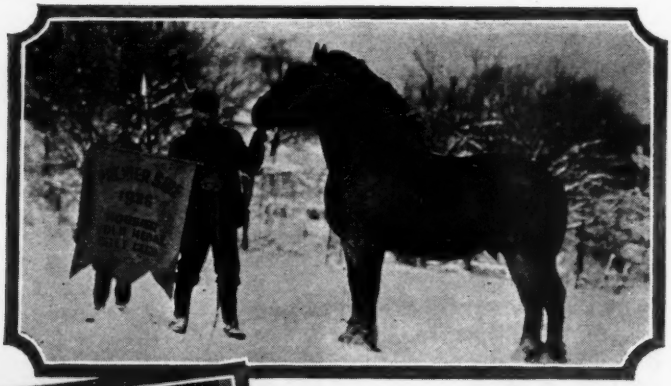


This creamery at Northwood, Ia., pays three cents more per lb. butterfat for fresh cream. It has 168 patrons who bring in their cream four times a week.



This novel exhibit was a part of the food show in Los Angeles, California. One pretty girl doled out cream from the top of the bottle while the other passed out milk from the bottom.

What a guard rail will do when put to the test is shown in this Pennsylvania highway accident. The cable guard saved lives and car.



Harvey Kern, Springport, Ind., and his Belgian stallion "Camille" that sired the greatest number of Gold Medal colts in Indiana in 1926

Jos. F. Lawson, 81, the oldest contestant in the Old Fiddlers' Contest held at Purdue University during the agricultural conference in cooperation with the Indiana Farmer's Guide

By writing the best original poem, this group of ladies won the 20-inch apple pie at tre "Know Your Neighbor" banquet for ladies, a feature of the recent Indiana agricultural conference

The Editors Talk

Things true and evident must of necessity be recognized by those who would contradict them.—Epictetus.

IN accordance with the code adopted at a recent convention of the National Fertilizer Association in Washington, a Bureau of Statistics is to be established.

TAKING THE GUESS OUT OF BUSINESS

The purpose of the Bureau is to inform members of the Association on the relations of supply and demand and of the general statistical conditions of the industry. Such information will relate entirely to past and completed transactions. Details have yet to be worked out.

This is a much needed move in the right direction. The statistical data available on fertilizer production and consumption are entirely inadequate. The whole field of fertilizer records needs a very extensive and thorough overhauling and to be put on a more uniform and complete basis.

Statistical work has two distinct parts:

(1) Compiling vital figures by uniform methods in sufficient detail.

(2) The analysis of such figures by modern methods, including correlations.

The object of such an analysis is to determine what it is that influences fertilizer consumption, and also to find the exact relationship between such factors, which is more important, and how much more important than others. Such an analysis makes it possible to take a great deal of the guess out of business.

Such methods have been greatly developed during the last few years. Many leading organizations in agriculture and industry now use them as an aid in organizing and planning their activities. Banks determine what it is that decides when a loan is a good one and a poor one. Studies of city milk marketing have been made by agricultural organizations. What are the factors that chiefly influence the marketing of fruit? This

has been determined by cooperative societies in cooperation with others.

Thus, some of the largest business organizations in the country, agricultural associations, and cooperative societies find it profitable to make an analysis of their business to find out what affects it the most. The fertilizer industry is already doing excellent work. The National Fertilizer Association must now be congratulated on its far-sightedness in including a Statistical Bureau in the code.

What is far-sighted now will be urgently needed ten years hence. The foundations cannot be laid too soon. As a business economist, Ray Vance, has said with some emphasis: "Patience, thoroughness, and a study of past conditions are necessary to properly interpret the present and the future." Thus, the compilation of vital data by the Bureau is fundamental and will go a very long way towards stabilizing production and distribution.

"When we're too old to learn, we're too old to live, and as long as we're green, we're growing."

BETTER CROPS CONGRATULATES

HOW often have you had somebody else express your ideas in such pat words that the "that's me all over" escapes you almost before you can think of grammar? BETTER CROPS has just experienced the same thing in finding its policy so clearly stated in the words of Dr. Seaman A. Knapp in the story appearing upon page 7 of this issue:

"The most important work just at present is to convey to the toiling masses of mankind whatever things of practical value genius has discovered and human experience approved and the usable knowledge scholars have acquired from any source and to present them in such a way that they will be accepted."

Dr. Knapp said that in 1908. Fifteen years later BETTER CROPS came into existence with policies so closely in line with his ideas that the editors might have been accused of plagiarism had they known of the existence of Dr. Knapp's statement. We

are very glad, therefore, to print Mr. Martin's article and say, "That's me all over."

Furthermore, we are anxious to congratulate the great movement of vocational agriculture which this month is celebrating its 10th anniversary and are glad to devote considerable space in this issue to subjects of especial interest to vocational teachers. That they are now a vital and indispensable force in the program of Greater Agriculture is not to be questioned. The visions of such far-seeing men as Dr. Knapp have reaped their reward in the enthusiasm for and faith in the future of farming as an industry which BETTER CROPS, a youngster among the farm publications, shares with the thousands of boys and girls studying vocational agriculture. We are proud to have the teachers as members of our big family of readers and want to extend to them our best wishes for the continuance of their good work.

That the spent earth may gather heart again,
And, better'd by cessation, bear the grain.—
Dryden.

A WARMER SUBJECT

THIS being the chilly month of February, we have written on the tropics in our Foreign and International section. Have you ever stopped to think of the large number of your every-day needs that are supplied by tropical crops, with the help of commercial fertilizers?

You may not believe in the use of fertilizers yourself. All right—yet if you travel on rubber tires, if you use sugar, coffee, or tea, eat many varieties of fruits, or use many sorts of fibre and oils, or smoke tobacco, you are depending on commercial fertilizers to supply many of your wants and such wants are supplied cheaper because of the use of fertilizers.

As civilization raises the standard of living, we must depend more and more on the crops of other parts of the world to supply our varied needs.

Some day, some one will figure out the question from the other angle—not the high cost of fertilizers, but the high cost of going without.

BUDGETS

A BUDGET is simply a plan. It is a plan to spend money and because it's a plan to spend money it also involves how we spend our time. The difference between a successful man or family and others is how the use these two things—time and money.

The budget, however, is no better than the plan and the way it is lived up to. Why do not more farmers use budgets?

Every successful enterprise knows the meaning and the value of the word "budget". In fact, the success of big business enterprises today is largely due to the application of sound principles of finance, the heart of which is a well planned budget. Budgets—that is, sound planning—are as old as man. Of all whom budgets can help, probably the farmer has been the least benefited. The reason for this is that too many farmers fail to keep farm accounts—to find out what crops or divisions of the farm are paying, which is necessary as a basis to wisely plan his future activities.

Many farmers have done this and they are successful. But the masses have not. They are loaded with debt and despondency. To make a financial success of farming or of any other business, one must keep accounts and plan. The plan must include staying out of debt, except as debts are incurred for productive purposes.

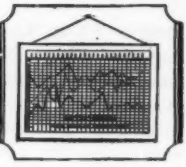
In speaking of debt, Carlysle says: "There are two ways of staying out of debt—increase of industry in raising income, and increase of thrift in laying out." This means planning. Happiness is invariably based on thriftiness. Thriftiness, as Carlysle implies, is based on good planning. Good planning includes the principle of budgeting.

PLEASE HURRY

WE want to thank the county agents who have so kindly cooperated with us in returning the post-cards which we sent out with the January issue to verify addresses. However, there are a considerable number of readers who have not complied.

We are anxious to know that our mailing list is complete and that we are sending magazines to the right places. Won't the county agents who still have the cards kindly return them to us at their earliest convenience?

AGRICULTURAL DEVELOPMENTS



By P. M. Farmer

Corn Borer Stirs Scientists

The spread of the corn borer during the past season into West Virginia and Indiana and reports that it has passed into the fields of Illinois have led to renewed activity on the part of state and federal officials. Early in January representatives of 20 states met in Washington at the call of Dr. A. F. Woods, Director of Scientific Work of the Department of Agriculture. They agreed that it is only a matter of time when the pest will have to be reckoned with throughout the corn belt. Then, they say, it will be necessary to burn all corn stalks, plow them under deeply, put them into the silo, or destroy them in some manner, such as by burning, before May 1.

Strict quarantine regulations now enforced prevent the rapid spread of the borer but the natural spread of the insect goes on steadily at the rate of 20 to 30 miles a year while the infestation increases in intensity in the areas formerly infested.

Clean-up programs are being outlined, parasites are being introduced, low-cutting machinery is being developed, resistant varieties of corn are being studied, industrial utilization of stalks is being studied, and more is being learned of the ways of the insect.

Bigger Yield—Greater Profit

The crop surplus problem, the root of most of the farm relief demands, has resulted in a widespread belief that it doesn't pay to grow big crops. But when the individual farmer is considered it does pay to have a big yield per acre. M. L. Mosher, a farm management specialist at the University of Illinois, has 230 farmers about the State who are managing their farms according to his advice. With a large amount of data taken under actual farming conditions he has found the farmers who got the largest crop yields also got the largest total net return on investment. He found: On 8 farms where corn produced 30 to 40 bushels the net income was 1.4 per cent; on 51 with an average yield 40 to 50 bushels the net was 2.3 per cent; on 94 with 50 to 60 bushels, 3.2 per cent; on 55 with 60 to 70, it was 4 per cent; on 9 farms with 70 to 80 bushels per acre, 4.9 per cent.

T B Losing Ground

There can be no doubt that ultimately bovine tuberculosis will be only a small factor in our livestock industry. Every additional report of progress of the fight being led by the Department of Agriculture shows more territory freed of the plague. The last report, issued early in January, showed 14 more counties in 10 states added to the "modified accredited" list, which means they have not more than one-half of one per cent of the disease left. The counties just added to the free list are: Jerome county, Idaho;

Buena Vista, Louisa, and Shelby counties, Iowa; Fayette and Johnson counties, Indiana; Allen county, Kansas; Roscommon county, Michigan; McLeod county, Minnesota; Gosper county, Nebraska; Bladen county, North Carolina; Clark county, South Dakota; Barron and Oneida counties, Wisconsin. In addition, the Department of Agriculture has also recognized as free the towns of Brookfield and Chelsea in Orange county, Vermont; and the town of Worcester in Washington county, Vermont. In North Carolina, Buncombe county has been reaccredited, the original period of three years having expired.

There are now 265 free counties in the United States and nine parts of counties. Congress is giving generous support to the campaign against the plague and more progress in eradication is looked for.

Coffee Responds to Stimulant

Experiments in the fertilization of coffee carried on by the Porto Rico Agricultural Experiment Station have shown some promising results, the crop responding almost immediately to applications of complete fertilizer and in some cases to applications of potash alone. Over a period of eight years, it is said, potash was particularly effective where nitrogen was used in addition. When nitrogen was used alone it had an adverse effect on yields. One series of experiments showed the yield from plots receiving complete fertilizer to be three times as great as from a check plot.

Sour Hams Result of Bacteria

The Federal Meat Inspection Service has again shown that it is of value as a research as well as regulatory organization. One of the scientists in this service, E. A. Boyer, has found that the cause of ham souring is a group of bacteria found throughout the carcass at time of slaughter and possibly present in the blood and tissues of the living animal. It has been shown that souring may be prevented by quick chilling after slaughter and by keeping a low temperature until the hams have taken up enough salt to keep down bacterial growth even at higher temperatures.

Tobacco Users Spread Mosaic Disease

Mosaic is a bad disease of tobacco and, like the tobacco habit, it spreads. According to recent experiments at the Kentucky Experiment Station, workers in the beds and fields who have the chewing or smoking habit are factors in the spread of the disease. In those beds sowed to tobacco seed and then not touched by man mosaic rarely develops.

Studies have shown that the virus of mosaic disease lives in dry tobacco as long as 30 years. Manufacturing processes necessary in making plug and other chewing and smoking forms do not kill it off. Workers, it is thought, get the juice of old infected tobacco on their hands and carry it to the plants. When workers were not allowed to use tobacco and were required to wash their hands before handling plants, mosaic did not develop in extensive plantings. When tobacco users did the planting infection was high.

The use of natural leaf has been found to be the most dangerous in the spread of the disease by workers while weeding and setting tobacco. Cigarets, smoking tobacco, commercial plug and twists are not thought to be of so much importance in the spread.

Foreign and International Agriculture

The purpose of this department is to help us understand the scientific, practical, and industrial agriculture of other countries and the international developments which result. The editor believes that such knowledge is now of the greatest importance in our agricultural prosperity. Every care is taken to insure accuracy—both of facts and their interpretation.

"Fertilizer Requirements of Tropical Plants and Soils"

A Review by G. J. Callister

TO most of us who live in the colder climates, the tropics seem a long way off—a happy region perhaps, for the fortunate few to visit in the winter time, the most important questions being how to get there and what it will cost.

Yet though we never visit the tropics, think how very dependent we are upon the crops of tropical and semi-tropical regions. Sugar, for instance, is now an every-day necessity. And how could we travel without rubber? Oils, fibre, tea, chocolate, tropical fruits, rice, and olives, are all part of our daily necessities. We now cannot do without these things. In fact, we must look to the tropics and to tropical crops, which may be grown in the more temperate regions, to supply more and more of our food and daily wants.

For this reason, the book "Fertilizer Requirements of Tropical Plants and Soils" by Dr. A. Jacob and V. Coyle, M. Sc., fills an important place in the world's agricultural literature.

Tropical agriculture is confronted with special problems of its own. The chief among such problems are the lack of farmyard manure and the heavy leaching of plant foods from tropical soils. This makes the use of artificial fertilizers a question of the most practical importance, especially if the cost of the production is to be kept at a minimum.

The aim of the book, therefore, is to show the tropical planter true economy in the use of complete manures, that is, the proper place of nitrogen, phosphoric acid and potash.

That artificial fertilizers can be used with success on tropical crops, has been demonstrated by practical tests on farms under actual conditions of economic production. The book provides ample proof of this in the results of such tests conducted in many countries as India, South Africa, Japan, the United States, Mexico, Cuba, Ceylon, Guatemala, Cameroon, Formosa, Brazil, Australia, Germany and Spain.

It is pointed out that the profitable use of such materials must be founded on experimental and research work. The more fundamental part of such work must always be done at experiment sta-

tions. "What the experiment station cannot do, however, is to adapt the general results of its investigations to the specific conditions of different plantations." This problem can only be solved by the planter himself. How can the planter conduct his own experiments to find the most profitable combination of fertilizers for his own land?

A very practical and simple discussion outlining plans for such work is given. It is based on the law of minimum. In fact, it would be a good thing if we all remembered this law a little more in planning experimental work. It would save a lot of confusion.

The function of the various fertilizer constituents in the plant is discussed. Of particular interest is a summary of the work of Professor Stoklasa, at Prague, on the role of potash in the formation of carbohydrates.

The use of potash in the production of tropical crops has been rather neglected. The chief reason is because the effect of potash is often not apparent to the eye. The effect is chiefly physiological. Economic conditions, however, are compelling more refined experimental and research work to determine the effect of the plant nutrients on the crop in every way possible. Potash will, therefore, become a much more important factor in tropical crop production, as the essential nature of this plant nutrient is better understood. The great danger is the continuance of "one-sided" manuring that is so often practiced. By "one-sided" manuring is meant the use of incomplete fertilizers, as nitrogen and phosphoric acid only.

That tropical soils are very fertile is a common misconception. Owing chiefly to the great humidity and higher temperatures, a great loss of silica and of the alkalies occurs, which of course includes potash. The composition of many soil types is given.

Following the general discussion on tropical soils, the use of fertilizers and experimental plans, specific directions are given for manuring tropical grain crops, tobacco, leguminous crops, olives, peanuts, castor oil plant, and sesame—the manuring of tea, coffee, and cacao, sugar cane, fibre plants, palm trees, tropical root crops, vegetables, and fruit crops.

The book gives a well-rounded and excellent viewpoint on an important subject and is very useful to both the planter of tropical crops and to the research worker as a reference.

* * *

My Apples—1926

(*From page 22*)

this fruit was found was commented on by others who accompanied me through the orchard and personally examined it. One man, a farmer and fruit grower of many years' experience, also a student of agricultural matters, made a statement to the effect that "only under the same conditions where the trees had an abundant supply of available potash to draw upon, can be found Gravenstein apples that are holding up as these are and still maintaining this excellence of quality."

The general condition of these trees is fine and full of promise for the production of another heavy crop next year; this following the heaviest crop they have ever carried. In fact it is, undoubtedly

(*Turn to page 60*)

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Soils, Fertilizers, Economics, Crops, Crop Diseases, and Insects. A file of this department of BETTER CROPS would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

For a number of years farmers have known that crops grown on muck lands are liable to frost injury. The danger from frost is worse in the northern muck regions.

Recent investigations at the Michigan Agricultural Experiment Station reported by M. M. McCool and P. M. Harmer, in Quarterly Bulletin, Volume 9, No. 2, November, 1926, show that an important relation exists between fertilization and frost resistance.

It is pointed out that use of fertilizers lowers the freezing point as much as 3 or 4 degrees Fahrenheit, which in many instances is enough to pull a crop through a frost snap. This fact is of great importance in early spring when the young seedlings are just emerging and also in the season when the plant is approaching maturity.

The explanation for this influence of fertilizers is that they produce a higher osmotic pressure in the cell sap. The more concentrated the cell sap, the more mineral salts it contains and hence the lower its freezing point.

Of particular importance in this study is the fact that potash increases the concentration of the cell sap, while phosphorus has a tendency to reduce the sap concentration. Potash, therefore, again finds another important function to perform in successful growing of crops under muck soil condition.

"The Missouri Fertilizer Law," Agricultural Experiment Station, University of Missouri, Columbia, Mo., Cir. 152, Nov., 1926, F. B. Mumford, Director, and L. D. Haigh, Chemist.

"Commercial Fertilizers—Report of Inspection Work 1925-1926," West Virginia D. of A., Charleston, W. Va., Bul. 67, Aug., 1926, T. B. Leith, Chief Chemist.

Soils

"Legume Bacteria Population of the Soil," (Reprinted from the Journal of the American Society of Agronomy, Vol. 18, No. 10, Oct., 1926) J. K. Wilson, Department of Agronomy, Cornell University, Ithaca, N. Y.

"Peat," U. S. D. A., Washington, D. C., No. 12, Sept., 1926, Alice C. Atwood.

Crops

"The Relation of Weather to the Date of Planting Potatoes in Northern Ohio," Agricultural Experiment Station, Wooster, Ohio, Bul. 399, Dec., 1926, John Bushnell.

American Potato Journal, Washington, D. C., Vol. III, No. 12, Dec., 1926.

"Horticulture," Part 8, (Apples), Washington Agriculture, State College of Washington, Pullman, Wash., Bul. 134, Oct., 1926, O. M. Morris and M. D. Armstrong.

"Horticulture," Part 9, (Pears, Peaches, Prunes, Cherries and Apricots), Washington Agriculture, State College of Washington, Pullman, Wash., Bul. 134, Nov., 1926, O. M. Morris and M. D. Armstrong.

Economics

"Farm Economics," Auburn, Ala., Jan. 1, 1927, Vol. II, Nos. 1 and 2.

"Is the 100-Bushel Corn Yield Worth the Cost?" Crop Talk, The Ohio State University Cooperating with U. S. D. A., Columbus, Ohio, No. 40, Nov., 1926, John A. Slipher.

"Some Phases of Taxation in Pennsylvania," Parts I and II, Pa. D. of A., Harrisburg, Pa., Vol. 9, No. 24, Dec. 15, 1926, F. P. Weaver and Clyde L. King.

Diseases

"Removal of Arsenate of Lead from Sprayed Fruit," Colorado Experiment Station, Fort Collins, Colo., Press Bul. 63, Dec., 1926, Wm. P. Headden.

"Tipburn of Lettuce," Colorado Experiment Station, Fort Collins, Colo., Bul. 311, May, 1926, Ross C. Thompson.

"Three Important Perennial Weeds of Colorado," Colorado Experiment Station, Fort Collins, Colo., Bul. 313, Aug., 1926, Charles F. Rogers, L. W. Durrell and Leslie B. Daniels.

"Barberry Eradication in North Dakota," Agricultural Extension Service, North Dakota Agricultural College, Fargo, No. Dak., Cir. 73, Sept., 1926. George C. Mayone.

Insects

"Potato Spraying and Dusting Experiments 1921 to 1925, "Maine Agricultural Experiment Station, Orono, Me., Bul. 334, August, 1926, Donald Folsom and Reiner Bonde.

"Opinions of General Interest Regarding Questions Arising Under the Insecticide Act of 1910, U. S. D. A., S. R. A. Insecticide 57, Nov. 20, 1926.

* * *

Ten Years Old

(*From page 28*)

new department in these schools has brought about a wonderful change in the local viewpoint with respect to education, and has been responsible for the development of a new attitude toward many individual and community problems.

Without any attempt to make a complete analysis I would like to suggest what, to my mind, represent some of the more important results of vocational education in agriculture, as I have thought about them while observing the progress of the past 10 years.

First. The state and federal funds that have been made available to the rural schools have enabled them to employ a teacher of remarkably high qualifications. Every state pays at least 50 per cent of the annual salary of the full-time vocational teacher from federal funds, and many of them pay as much as one-fourth in addition from state funds. In this way, for example, a community in such a state may employ a teacher who receives an annual salary of $3,000 for one-fourth of the total amount, or $750. Since every teacher of vocational agriculture who is employed at this time is a four year college graduate, the rural schools are able to employ teachers with training and experience equal to the better prepared teachers in the city school systems.

Second. Most of the teachers of vocational agriculture are married men with families. They are employed for 12 months in the year. They are citizens of the communities in which they live. This is a condition far more conducive to school progress and stability than where none of the teachers are employed for the calendar year.

Third. The teaching of vocational agriculture has raised in the minds of the people the question—what, after all, is the aim and function of the high school? Is it, they are beginning to ask, to simply give such courses as will best prepare the few for college, or is its primary job to prepare the majority to live in the community that supports the school? It is well for such questions to be raised. We have developed an educational system that has grown like a mushroom and too few people have thought in terms of the ultimate objective of it all.

Fourth. This type of school instruction has brought the boy who wants to become a farmer an excellent opportunity for training. Moreover the method used in teaching dignifies labor by making it a part of the school requirements. At the same time it encourages the development of habits of thrift and industry—two of the virtues, by the way, which we would all do well to cultivate.

Fifth. The teacher of vocational agriculture has brought the

part-time and evening class to the rural community. Where formerly classes for those young men who had dropped out of school, and classes for adults were organized only in cities and in industrial centers now such classes are being organized for the farmer and his son. Last year 20,000 farmers attended "night schools" organized and conducted by vocational teachers.

Sixth. The vocational man makes the community the basis for his teaching and his work. He has a great opportunity for leadership. With his aid many communities have inaugurated activities and perfected organizations that have added greatly to the enjoyment and the prosperity of the patrons of the school.

Seventh. Vocational agriculture has been a stimulus to the agricultural college and the experiment station. It has provided a new field of employment for the agricultural college graduate. It has, so to speak, placed an emissary of the college and the station in the rural community—a representative who interprets these institutions to the people, who distributes their literature, and who aids in the dissemination and application of their recommendations. Furthermore, the teacher of vocational agriculture is a recruiting officer for the college. Ten per cent of the vocational boys who complete their high school work go to the agricultural college according to a study made several years ago by the Federal Board for Vocational Education.

Other results of vocational agriculture might be suggested such as the new relationship of the home and the school which the supervised practice work of the boys has brought about, but this and other obvious results need not be presented.

OVER the greater part of the 10-year period since this work was started the farming business has been on the bum. Today, based on the present condition, it is the most unpromising business for which any boy can prepare. This has had an effect on the progress of the work, and the remarkable thing is that under such conditions as have obtained since 1919 the enrollment in the agricultural classes, and the number of schools offering the course have consistently increased from year to year. This indicates, I believe, that vo-

Vocational boys visiting the New Jersey Agricultural College

cational agriculture has been accepted by the public as a worth while educational effort and as a factor in the agricultural development of the country.

But what of the future? Will the 10 years ahead see a further development comparable to that of the past decade? That there will be further development there is little doubt. It will, however, be nothing like that of the 10 years that have just elapsed. The federal grants for this type of education have reached maturity. There will be no increase in federal funds for vocational education in the near future. There is a growing sentiment in this country against all types of 50-50 legislation, that is, the kind where the government puts up a dollar that must be matched to be spent. Whether this is a wise attitude is very doubtful, but it is nevertheless a fact.

Further expansion of the program will depend on the attitude and the appropriations of the several states. Some states will continue to increase funds for this work just as they have during the past 10 years. Others are through. They will maintain the schools they have aided, but will not increase the number.

The Federal Act, we are told, was not designed to finance a nation-wide program of vocational education, but merely to promote an interest in this type of training. It has served this purpose well. It has brought to the attention of the public the need for a more practical type of education, as well as the practical value of such instruction. It has carved a niche for itself in the American system of public education. That is the reason, I think, why it is worth while to give some thought to the passing of the tenth birthday of vocational education in agriculture.

* * *

California

(*From page* 18)

summer conditions. Berseem or Egyptian clover, a splendid forage crop, has been found to yield three or four crops during the winter season besides a crop of seed at the beginning of summer. Dairy stock prefer it to alfalfa. The Calcarata vetch under test at the Imperial Valley Experiment Station produced six to eight tons of green manure for plowing under in February and has been found to thrive at the University Farm at Davis in the Sacramento Valley.

Tests with the mung bean show that it produces good crops of pasturage or green manure on irrigated ground in summer under high temperature. The seed is relished by poultry and is good human food. The mat bean, another legume from Asia has been found to produce excellent summer forage and large quantities of seed relished by poultry. Both the mung and the mat beans are quite drought and heat resistant and rotate well with winter cereal crops.

Harding grass, an introduced species, meets the demand for a summer and winter growing pasture grass in the cooler areas of the coast ranges materially improving the carrying conditions of the ranges and pastures where it is adapted.

The investigations in plant nutrition of the California Experiment Station are carried on both at Berkeley and at Riverside. The

main projects are concerned with the basic principles of soil and plant relations. In one series of investigations, the guiding idea is that the mineral nutrition of the plant is directly dependent on the composition of the soil moisture. It appears, therefore, indispensable to determine the nature and concentration of solutes present in this moisture, with special reference to the changes in its composition which occur as a result of crop growth, seasonal influences, fertilization, cultural operations, etc.

During the past 11 years, a series of soils obtained from various parts of the state has been very intensively studied from the point of view indicated above. Two principal methods of procedure have been employed, namely, water extraction of the soil and the displacement of the soil solution in an undiluted state.

It has been found that the soil solution is constantly undergoing change and that it is strikingly influenced by the growth of a crop. Continuous cropping for a number of years may decrease very significantly the power of a soil to maintain essential solutes in the soil solution at concentrations adequate to the needs of the plant. In many instances, at least, no other cause for diminished crop yields need be sought. It should be added that the evidence indicates that it is very important that the nutrients be made available at the proper stages of growth. Both yield and quality are involved in this adjustment.

Soil solution studies have also made clear how essential are the activities of micro-organisms in the formation of soluble material. The production of various acids for which these organisms are responsible implies, also, the solution of bases, particularly calcium, magnesium and potassium. Thus the examination of soil solutions may frequently offer the most direct means of evaluating the functions of soil organisms in terms of plant growth.

The action of micro-organisms, and the effects of fertilizer cannot be understood without a knowledge of the reactive colloidal silicates of the soil. At Riverside, much time is devoted to studying these substances, which also have extreme importance in connection with investigations on the formation of "black alkali." Certain field experiments looking toward the reclamation of alkali soils are based on information which has been gained with respect to the manner in which these soil colloids react chemically.

Concurrently with the investigations on soils, many physiological researches have been initiated pertaining to the nature of the absorption of mineral elements by plants. Studies of this type in progress at Riverside are directed toward the elucidation of the causes of various disturbances in the nutrition of citrus and walnuts.

* * *

Just Received—Forecast 19 Years Old

(*From page* 8)

cellence worthy of a great people unless education and training be taken to the adult population as well as to the youth. However excellent and complete may be the instruction of youth in the schools, parental authority and home environment, if of a lower level, will ultimately determine the standards of the future. The education of

the adult should keep step with that for children and youth so that there may be a material prosperity and an intellectual growth coordinate with developing childhood under the guidance of a wise instructor to the end that the natural leadership of the parent may continue unbroken. For obvious reasons what is taught to adults should be practical and fully proven by demonstration so as to carry conviction and it should promote leadership.

The men of this age are not seeking heroes. The greatest demand today in American homes and in all the varied lines of industry and business is for honest, intelligent and faithful service. Homes are broken up because such service cannot be secured, farms are idle and business halts, awaiting the approach of men who know and will faithfully do. It is all a matter of training.

"Such effort as is now being made to carry helpful knowledge to the homes, the farms and the workshops is in the line of highest duty and is accomplishing the work of greatest value.

"Until the equation of knowledge is better balanced, more of the money and of the energy of the people should be turned in this direction."

Since this letter was written the Smith-Lever Extension Bill became a law and the Smith-Hughes Vocational law was also enacted. Five thousand extension agents are now trying to teach adults and juniors to do useful and helpful things in agriculture and home economics. Five thousand vocational teachers are teaching adolescents et al. to know more along practical lines for use in daily life. All of them are emphasizing the demonstration method more and more, for Woodrow Wilson said, "It is the only method that generates real education, the personal touch with the man who is doing the demonstrating."

* * *

A Burning Question

(*From page* 14)

water and certain soluble plant foods pass from the soil solution into the plant and *osmotic pressure* is set up. Osmotic pressure causes distended and turgid plant cells. The plant stands erect and unwilted.

If, now, the conditions are reversed, if the plant cells of the root become surrounded by a stronger solution than that in the cells the movement of water is reversed, water is withdrawn from the plant, the cells collapse and we have what is known to plant physiologists as *plasmolysis,* see figure 2. If the whole root system is affected the plant wilts and dies of "burn." If only portions of root system are affected, "burn" may be present on certain leaves only.

The important point to note in this discussion is that it is the concentration (strictly speaking, osmotic pressure) of soluble substance that causes "burn" rather than the amount of plant food. Common salt, which contains no essential plant food, will cause "burn" just as surely as will sodium nitrate or ammonium nitrate which contain 18.8 per cent and 41 per cent ammonia respectively. Cane sugar in large amounts will also do it. See figure 1. Figure 3 demonstrates further the effect of concentration on "burn."

The two sets of corn seedlings were treated with such amounts of solutions of sodium nitrate and ammonium nitrate as to give equivalent plant food when expressed as ammonia. This means that 2.2 times as much soluble material was applied to the roots in the form of sodium nitrate as was applied as ammonium nitrate; but should not be construed as an indictment against sodium nitrate as a source of nitrogen.

Many experiments have shown the retardation or entire inhibition of germinatoin by fertilizers in contact with or near the seed. Coe, for example, found complete inhibition of corn germination by as little as 60 lbs. of sodium nitrate when applied in the hill. Truog and co-workers found that 100 lbs. 2-12-2 mixed fertilizer reduced germination to 25 per cent and 200 lbs. of the same entirely inhibited it.

Investigations to date indicate strongly at least six factors affecting germination; they are:

(1) Kind of crop.
(2) Fertilizer material used.
(3) Rate of application.
(4) Method of application.
(5) Class of soil.
(6) Climatic conditions — especially moisture relations.

Discussion of these factors:

Potato shoots are more sensitive to fertilizers than are those of corn, and can not grow up through a layer of fertilizer as well as can corn. Truog ascribes this difference in sensitiveness to osmotic pressure or concentration of the cell sap, the potato having the lower osmotic pressure. The method of growth is also a factor of importance. Coe, in studies with tolerance of plants for ammonium phosphate gave the following order of resistance: corn, oats, barley, mangels, carrots, radishes, lettuce. Lettuce is well known as a fertilizer-sensitive crop.

Soluble materials are in general the cause of greatest injury to germination, but differ among themselves. For example, in one test sodium nitrate gave more in-

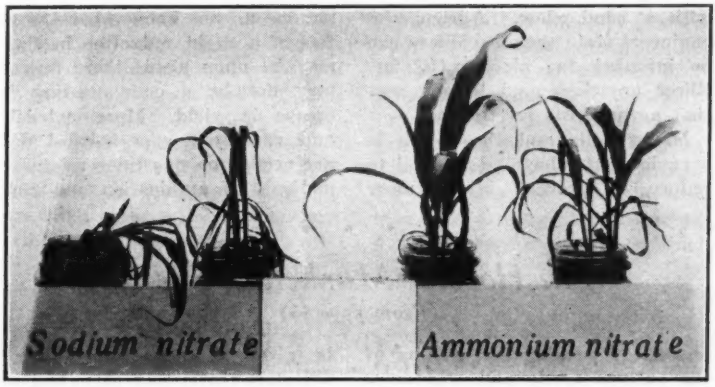


Fig. 3—Although receiving equivalent amounts of plant food as ammonia the corn seedlings on the left received 2.2 times the amount of soluble salt given those on the right. As a result the plants receiving sodium nitrate are either dead or badly "burned" while those treated with ammonium nitrate show only slight "burn"

jury than did ammonium sulfate. Apparently some materials have specific properties of more or less toxic nature that produce injury aside from "burn." Acid phosphate has been found to cause little injury.

Of the various methods studied that which allows the fertilizer to come in contact with the seed gives the greatest injury to germination. The above-the-seed method was found better than below-the-seed, except for potatoes. In general, side application has proved the best. The method of thoroughly mixing the fertilizer in the row has not been studied extensively; this method deserves more attention. From present data it appears to make considerable difference in results whether the fertilizer is thoroughly mixed with the soil or merely placed with or near the seed. In a test at the Massachusetts Experiment Station we found that as much as 1,000 pounds of mixed fertilizer could be used for mangels with no reduction and 2,000 pounds for corn with little reduction in stand, when the fertilizer was mixed in the row with a hand plow. Agricultural engineers state that machinery can be invented for placing the fertilizer anywhere and in any way that agronomists recommend.

Heavy soils and those rich in organic matter have been found to reduce or prevent injury more than sandy soils. This is a sort of buffer action and appears to depend upon the total internal surface of the soil.

The various factors of climate such as temperature, wind velocity, atmospheric humidity and soil moisture no doubt exert more or less influence upon the relation of fertilizer application to seed germination and plant "burn." Of these, variation in soil moisture content has been most extensively observed under experiment and in practical experience. It has been found that injury to seed and seedling by fertilizer is less likely to occur with a high moisture content than with low moisture; a wider margin of safety is desirable under arid or drouthy conditions than under humid conditions.

Just what relation all of this bears to yield is not fully known. Actual experiments on this point are meager, but indicate that a great deal depends on the kind of crop, its growth habits and methods of culture. Unquestionably, if the stand of a crop is materially reduced by "burn," the yield of the crop will be reduced; but we do not know what the effect of a slight reduction in stand may be upon yield; there may or may not be a compensating increase in yield. More extensive and conclusive experimental data are needed on questions related to methods of application and yield.

* * *

The Hoosier Marketing Special

(*From page* 15)

lessons of packing and cooling of the various fruits and vegetables were more forcibly emphasized.

Next to the refrigerator car came two lecture cars, equipped with a daylight screen, so that movies, as well as lectures, could be given at each stop.

Before the lecture cars came one of the most interesting cars on the train—the exhibit car—where both good and poor packages and packs were displayed. In this car were forcibly driven home "quality

packs" and the profits from them. Apples, peaches, tomatoes, cantaloupes from Indiana and competing territory were on display, showing both the quality pack and the poor pack. In the car also was emphasized the value of government inspection as a factor in establishing and maintaining a uniform standard of quality. Growers, business men, as well as consumers, went through the car and many for the first time saw the value not only of buying but of selling quality products.

Back of the exhibit car came the club car, or living quarters of the staff. Here kitchen, dining room and living quarters were maintained in keeping with the high standards set on the remainder of the train

The train was run as a special the entire week, on its own schedule with its own engine and train crew, which were unexcelled for service

Sixteen scheduled stops were made and a mass meeting was held each night alongside of the train, where lectures and movies told the story of the production and marketing of profitable quality crops. At noon, business men's organizations, Chambers of Commerce, Rotary Clubs and similar organizations held dinner meetings where farmers and business men met together to talk over the problems of marketing and cooperation so essential to their mutual success.

As a result of the operation of this marketing special business men and fruit growers became more interested in each other's problems, the size and importance of the industry were brought out and every one got enthusiastically back of a greater program for town and country. Four new cooperative packing and selling organizations were formed, government inspection was established in the district, fruits and vegetables were more rigidly graded, better packed, and shipped under strictly U. S. No. 1 standards, with government certificate of inspection attached.

As a result 500 cars of peaches sold on central markets at from 50c to $1 a bushel more than those from competing territory and returned profits to the growers in spite of the greatest peach production in the history of the country. Cantaloupes and tomatoes showed a decided improvement in pack and quality.

The marketing train served as a leading factor in starting this section off on the road to profitable returns. It carried not only information but concrete examples of what and what not to do direct to the doors of the growers of the crop, just ahead of the marketing period, when they could use the information to the best advantage. Thus, the marketing special blazed the trail for the follow-up work which is making for this section a reputation for quality products.

* * *

Bringing Farm Boys Back to School

(*From page* 11)

science. Text books are not used. The arithmetic studied are problems that arise in the study of agriculture.

"I don't mind working arithmetic examples like figuring fertilizer formulas," said John Brown. For the first time in their lives several of these young men learned what a fertilizer formula means.

There were other arithmetic examples that came from the shop work. For instance, the class learned to make a terrace drag from a blue print. This necessitated figuring a bill of materials and listing the cost by items. Many other practicable examples that are of every day use on the farm were studied.

Such instruction as writing business letters and filling out notes, deeds, mortgages, and other forms that are used by farmers was given. The boys were taught how to figure interest on money and discount notes.

Each day the boys learned to spell 10 words, which were assigned the previous day. Words of every day use on the farm were given. The spelling was both written and oral, and the old time method of giving head marks was used. A prize was awarded the boy with the most head marks at the end of the course. Much interest was manifested in spelling, and most of the boys learned to spell every word assigned during the entire course.

The most interesting part of the course to the boys was the shop work. Farm appliances that could be carried home and used were made. Each boy made a harness clamp, two single trees, a double tree, a terrace drag, and a plow beam. Part of the lumber and material used in making these things was furnished by farmers in the community, and the boys made them on halves.

In the study of soil improvement the boys have learned how to increase the fertility of the soils by the use of leguminous crops, and how fertility may be maintained by proper terracing. The job of terracing land was not taught in a superficial way, but through actual experience. The terraces were laid out by the use of a terrace level, and constructed with the terrace drag, which was made by the class. These boys have applied the knowledge obtained about terracing on their home farms this year.

In addition to the school and classroom work these pupils grow crops at home under the supervision of the agricultural teacher. Accurate records of cost and labor are kept on each crop.

The citizens of Winterville believe that the school is offering instruction and training to boys who are future farmers of the community. They also think that the course given will make of them better farmers and citizens, fitted to carry on the business of farming in a more profitable and intelligent way.

Due partly to the success of the part-time class at Winterville in 1925, there were 43 such classes conducted in 1926 by the Vocational Agricultural Teachers of Georgia. About 700 farm boys who had dropped out of school were induced to return, and were given instruction about the work in which they are engaged. There were 954 two-hour class meetings, most of which were held at night. The teachers of vocational agriculture of Georgia have adopted the following slogan for 1927: "A Part-Time Class in Every School."

* * *

Up-to-date

(*From page* 9)

was practical and what was not practical for our section, soil, and climate.

From all my experience and observation I have received more profit from a fertilizer carrying not less than 6 per cent potash than any other.

The more fertile the land the more profit from fertilizer. The more organic matter and nitrogen put into the soil through legume crops, the more potash and phos-

phate necessary to make the maximum yield. You would not expect to get more service from a wagon with one wheel off, neither can you get the largest yields from your crops if you leave off one of the main elements to produce it.

I will relate an experience I had this year that will illustrate plainly my meaning and also the value of potash to the sweet potato, which is one of the leading crops of Henry county. One of my neighbors (a new one two years from Kentucky) came to me this spring and asked me what kind of fertilizer to get for his sweet potatoes as he never got but little benefit from fertilizer.

I asked him what kind he had used. He replied the cheapest he could get. I asked if it was 16 per cent acid phosphate. The answer was yes, but he wanted to use the same kind I did this year. I explained to him as I understood it what acid phosphate was and also that the sweet potato used a large percentage of potash in maturing a maximum yield, and it was necessary to have the potash in the fertilizer for the proper development of the potatoes.

The ground he intended to set to potatoes was well supplied with organic matter and nitrogen. And so I suggested he used 300 lbs. of 10-4 (10 per cent acid and 4 per cent potash) leaving out the nitrogen as this crop does not need a heavy growth of vine for best results, or 200 lbs. 8-2-6 if he could not get the 10-4. The result was he made better than 50 bushels increase per acre over where he used no potash, as I asked him to leave a few rows to check up results.

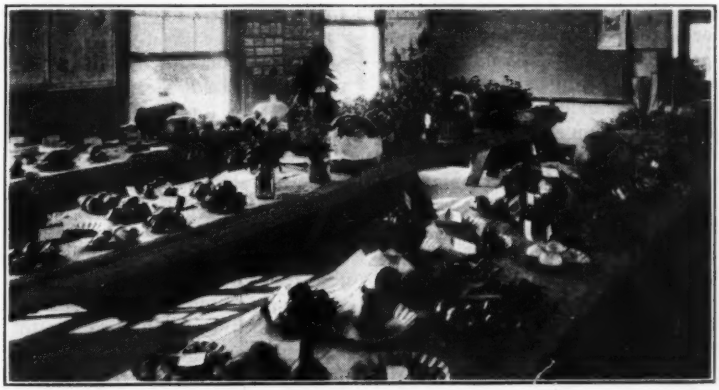
Here are the results of potash over 16 per cent acid phosphate.

50 bushels of potatoes at 50 cents per bushel.....$25.00
Difference in price of 16 per cent and 8-2-6 on 200 lbs.. 1.36

This made a net gain of....$23.64 per acre when sweet potatoes are only one-half of their normal price. If the usual price of $1.00 at digging time had prevailed the net profit from the use of potash would have been twice this amount.

My neighbor was leaving off one wheel of his wagon when he left off the potash in his fertilizer, and the loss as a result of it was enough to produce the crop.

We as farmers should study the needs and requirements of our crops as closely as we do the needs of our hogs and cattle if we wish to achieve success.



An exhibit staged in New Jersey by vocational boys

Wisdom + Fertilizer = Better Cotton

(From page 6)

II—*Most Profitable Fertilizer Analyses for Important North Carolina Soil Types for Cotton with Good Cultural Methods*

In Coastal Plain

Type of Soil	Best Fertilizer Formulas			Most Profitable Application per Acre-Pounds
	Phos. Acid	Ammonia	Potash	
Norfolk fine sandy loam.....	6	5	3	800
Norfolk sandy loam	8	7	3	600 to 900
Marlboro fine sandy loam.....	6	5	3	600
Portsmouth sandy loam	8-9	5-6	2-3	600 to 900
Dunbar fine sandy loam	7-8	4-5	3	800
Ruston sandy loam	7-8	5-6	4-5	900
Wickham fine sandy loam	6-7	6	5-6	900
General for Coastal Plain ...	8	5	3	600 to 900
In Piedmont				
	Phos. Acid	Ammonia	Potash	
Cecil sandy loam	10	4	2	600
Cecil clay loam	10	4	2	600
Georgeville silt loam	10	5	3	600 to 800
Durham coarse sandy loam ...	10	5	3	800
Alamance silt loam	10	4	4	600
General for Piedmont	10	4	2	600 to 800

These results have been derived from the results of a large number of carefully conducted field experiments with cotton in each section. As an average of all of these from the Coastal Plain section, it is suggested that a good safe analysis for the fertilizer to have for average soils for cotton will be 8 per cent available phosphoric acid, 5 per cent ammonia and 3 per cent potash. Of course, where the ammonia application is divided, as is frequently done, the percentage of ammonia in the mixture used at planting should be reduced, generally about one-half if as much as 100 to 150 pounds of nitrate of soda or sulphate of ammonia are used per acre as a side-dressing after chopping. Of this mixture on Coastal Plain soils use 600 to 800 pounds per acre.

For the Piedmont section, it will be seen that analyses of fertilizers are given which have been found best suited for five important types of soil. Here, as in the Coastal Plain section, the analyses of fertilizers are given for soils of each in an average condition. As the amount of organic matter in the soil is increased, the percentage of ammonia in the fertilizer mixture should be reduced accordingly. Taking the average of all these results, the analysis of fertilizers for soils of the Piedmont section in average condition to use, is 10 per cent available phosphoric acid, 4 per cent ammonia and 2 per cent potash. The most efficient quantity to use in this section for cotton, where good cultural methods are practised, is from 600 to 800 pounds per acre in the drill at

planting.

As will be seen from the average results given in Table III, there was a progressive increase in the yield of seed cotton in both the Coastal Plain and Piedmont regions of the State as the quantity of fertilizer was increased by 200-pound increments from 200 to 800 pounds per acre over where no fertilizer was applied. The net returns for $1.00 invested for fertilizer in the Coastal Plain section varied from $2.99 where 400 pounds were used to $4.11 where 800 pounds per acre were applied. It will be seen from the average of these results of seven years on Coastal Plain soils that the most economical quantity to apply from the standpoint of returns per $1.00 invested was from 800 pounds per acre, although the greatest returns per acre were obtained from the use of 1,000 pounds.

As an average of five years' field results as seen in Table III in the Piedmont section, the returns for $1.00 invested in commercial fertilizers varied from $3.83 to $8.22. From the standpoint of investment per $1.00, the use of 200 pounds was the most efficient. However, from the standpoint of maximum net returns per acre, the use of 1,000 pounds gave best results.

In our experiments, it has not been uncommon to find that the use of a different analyses of fertilizers applied, suited to the particular soils, produced sufficient increases in yields over the use of the same amount of a fertilizer of different analyses, which are quite commonly used by growers, to pay for the entire application of the better suited mixtures.

Field results have strikingly shown, too, the importance of higher nitrogen and potash content on most soils of the Coastal Plain.

The use of 600 to 900 pounds per acre of a 6-6-3 mixture with cotton has given increases in yields over that secured by the same quantity of a 9-3-3 mixture applied in the drill at planting to more

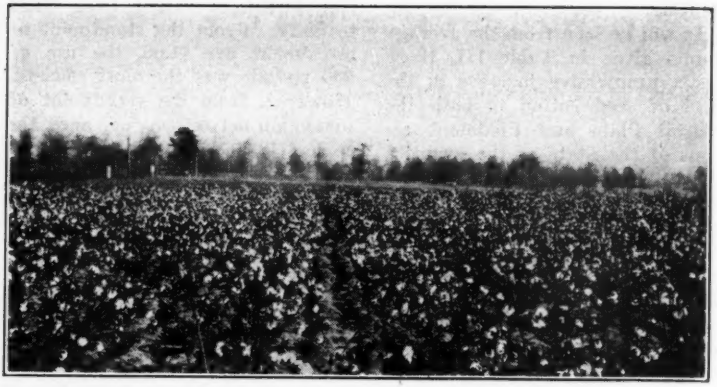
III—*Effect of Different Quantities of Complete Fertilizer Upon Yields and Profits in Cotton Growing*

In Coastal Plain—Edgecombe—Seven Years

Acreage Application 7-3-2½ Fertilizer—lbs.	Acreage Increase in Yield Seed Cotton—lbs.	Acreage Value Increase at 7c per lb.	Cost of Fertilizer per Acre	Profit per Acre over Cost of Fertilizer	Net Returns for $1.00 Invested in Fertilizer
200	179	$12.53	$3.05	$9.48	$3.11
400	348	24.36	6.10	18.26	2.99
600	667	46.69	9.15	37.54	4.10
800	890	62.30	12.20	50.10	4.11
1000	1000	70.00	15.25	54.75	3.59

In Piedmont—Iredell—Five Years

Acreage Application 7-3-2½ Fertilizer—lbs.	Acreage Increase in Yield Seed Cotton—lbs.	Acreage Value Increase at 7c per lb.	Cost of Fertilizer per Acre	Profit per Acre over Cost of Fertilizer	Net Returns for $1.00 Invested in Fertilizer
200	402	$28.14	$3.05	$25.90	$8.22
400	707	49.49	6.10	43.39	7.11
600	858	60.06	9.15	50.91	5.56
800	939	65.73	12.30	53.53	4.39
1000	1053	73.71	15.25	58.46	3.83



A field of cotton in the Piedmont well fertilized with complete fertilizer

than pay for the whole of the application of the better adapted mixture to soil types by the following amounts for the important types indicated in the Coastal Plain region of North Carolina.

Dunbar fine sandy loam....	$6.65
Portsmouth sandy loam.....	4.98
Wickham fine sandy loam...	17.43

It is believed that fertilizer manufacturers, especially through their field forces may exert a very great influence in helping bring about the use of the most efficient kind and amounts of fertilizers by cotton growers of the State. There is no question but what the interests of growers and manufacturers are the same when it comes to securing maximum financial returns per acre for dollars invested by growers in fertilizers. Those manufacturers who supply farmers, other things being equal, with fertilizer mixtures which are best suited to their particular conditions and needs, will have contributed vastly to the improvement of the financial condition of farmers of the South.

* * *

The Business of Community Growth

(*From page* 23)

used in community development. One man gave an entire city block on which to build this community house. This block is located in the very heart of the community center. One merchant donated 66 large seasoned Misquite blocks for the foundation.

A contractor was hired to supervise the work but all the other labor was donated and done by the citizens of the community. We can not blame people for being slow to assist in even the best of undertakings when these undertakings are started and conducted in a loose and unbusinesslike manner. This community house stands out as a concrete example and demonstration of what people will do when they are sure that their contributions, whatever they might be, will bring results.

Plans for a building 70 feet long and 40 feet wide were drawn up and the amount of material figured. A bill of lumber was made out consisting of all the heavy foundation timbers, the frame lumber, flooring, ceiling, siding,

and in fact all the necessary material needed except the shingles and windows. This bill of lumber amounting to $1,605 was sent to a lumber mill in East Texas and all this material was shipped in a car direct from the mill to Riviera. Such savings as this enabled the Riviera Community to construct, completely finish and paint this splendid community house with its large stage and dressing rooms at a cost of only $2,700 including labor.

THE outstanding display of organized effort and community spirit, the climax of this program and undertaking, was demonstrated when the men, women and children of the Riviera Community met for an all day "Shingling Bee" and put the big roof on the community house. At that time of year the stockholders, who are for the most part farmers, were very busy with their crops and the work was going slow at the community house. The county agent stopped at the new building and found the contractor very discouraged on account of not getting any help. He said that when one or two men came to work they stayed a day or so until they were getting where they could do pretty good work and then would leave and another one or two would come.

The county agent asked the contractor when he would have the building ready for the shingles. He said in about a week. The building committee was visited, and at the regular monthly community meeting it was decided to hold a "Shingling Bee." The weather man gave a clear day and the people flocked in from all directions bringing hammers, saws and baskets of food. By nine o'clock there were 24 men on the roof driving shingle nails and they stayed there until the good women of the community called them to dinner the like of which could not be beat.

In order to make this dinner more attractive and filling the Dairy Products Company of Kingsville, Texas, donated enough ice cream to furnish a generous dish of cream for all. At three o'clock in the afternoon in the shade of the nearly covered roof the ladies served iced tea and coffee to the workmen, and at six o'clock when the men had met from both sides at the top and the saddle boards were securely nailed, the supper bell called the community together again and the big feast at that time was made up from what could not possibly be eaten at noon. This day's work brought the people of the community closer together, it completed the roof, and made the remainder of the work on the building come easy. The "Shingling Bee" was such a success that when the time came for ceiling the walls a "Ceiling Bee" was held with as much interest and success as the "Shingling Bee."

It takes just such shoulder to shoulder effort to build any community. What Riviera has done other communities can do. It took struggle and effort to carry out this program to completion. It took somebody's time. It took night meetings. It took gasoline. It took the giving of self to build this structure just as it takes the giving of life to accomplish any upward movement. But the "back-logs" that kept the fire burning through the proposed changes of plans; through the changes in personnel of the committee, and through the financial depressions were the business principles on which the work was started.

Bergstrom Teaches Fertilizer's Value

(*From page 27*)

such plants grown on portions of fields fertilized with phosphates and on untreated portions the mineral content is considerably increased in the plants grown on the fertilized plots. This has a direct bearing on animal health because authorities are now advocating mineral feeding."

IN connection with the use of commercial fertilizers for clover and alfalfa, we might mention here the work done by Emil Truog, professor of soils at the University of Wisconsin, on potash starvation of these crops. Investigations in Wisconsin have shown that one of the causes for the decline in various clover crops is lack of sufficient potash.

Alfalfa and all of the clovers use large quantities of potash and cannot do their best when there is a shortage of this element. One of the indications of potash starvation in alfalfa is tiny white spots the size of small pin heads appearing on the leaves, while the same thing in clover is indicated by similar yellow and brown spots.

Professor Truog believes that inasmuch as it takes four tons of farm manure to supply the potash needed by a ton of alfalfa or clover hay, that a potash fertilizer is a more economical way of supplying this element to the soil than by means of manure. For clover he recommends 100 to 200 pounds to the acre of a potash fertilizer. For alfalfa this may well be increased to 300 to 500 pounds to the acre.

Potatoes fill a large place as a cash crop in Skagit county because of the large acreage of peat and muck lands that are ideal for tuber production. Bergstrom related to us, "Demonstrations on many farms show that on the peaty soils of this county potash has always given better results when used with phosphates than when either of these fertilizers are used alone.

"A typical example of this is a demonstration that we made on Alfred Johnson and Sons' farm. We applied 10 loads of manure per acre to the entire field. It was a nice mellow peat soil. On one acre we spread 250 pounds of superphosphate in addition and on another we added 150 pounds of muriate of potash and 250 pounds of superphosphate. When these potatoes were dug up we weighed culls and everything so as to get the total production. We found that the first acre produced 9.58 tons, the second 12.17 tons, and the third 13.24 tons. Moreover, there were far less culls from the acre where the potash was used.

A considerable interest has been centered in potatoes in the county. A number of our growers are raising certified seed. What is more they won 9 places with the 11 entries they made in the last Western Washington Potato Show. They realize that consumers are beginning to demand better grades so they are trying to produce the kind the market wants by planting better seed. We have had several very interesting potato tours."

Chambers of Commerce in Skagit county have been pushing the sugar beet industry in recent years so Bergstrom has made some fertilizer experiments with this crop. On the W. J. Knutzen farm beets were planted on peat land. One plot was treated with 200 pounds acid phosphate and 100 pounds muriate of potash. The peculiar thing about this test was that the

seed did not even come up where no fertilizer was applied. The only seed that grew in the unfertilized part of the field was in a little strip where Knutzen drove into it to empty out his drill after he had applied the fertilizer to the test plot.

There are many countries in the United States that could show equally interesting results with fertilizers, so we asked Bergstrom what might be the secret of his success in getting farmers to so rapidly adopt the use of them. He only smiled and said, "I do not know unless it is that I always ask to leave a strip of land without any fertilizer on it so they can satisfy themselves that they are getting results."

* * *

P. L. Johnson—Gold Medal Farmer

(*From page 20*)

heavy wind storm blew down a lot of the corn causing many immature and rotten ears.

"This test has clearly proven to me the advantage of proper rotation of crops, thorough preparation of the seed bed, proper fertilization and good cultivation, and I shall endeavor to care for our entire crop in a similar manner in the future."

Mr. Johnson is not only a successful corn grower, but he has the highest testing dairy herd in Knox county. In 1925 seventeen head of his purebred Jerseys, that were on test, averaged 317 pounds of butterfat. He also keeps a herd of purebred Chester White hogs, maintaining from 10 to 12 brood sows.

"I feed all of the corn on the farm to the fattening hogs, my dairy herd and the work horses," said Mr. Johnson, "and I attribute much of my success in growing good crops to the livestock, and more especially to the dairy cattle, which help me maintain the fertility of the farm. I usually have about 35 or 40 head of cattle, including the young stuff, and I keep records on all of the milk cows, trying to improve their production by purchasing sires from high producing herds and keeping heifers

Getting ready for spring—P. L. Johnson in his farm work shop

from only the high producing individuals in my herd."

Mr. Johnson churns an average of 150 pounds of butter each week, the power for which, he gets from his own Delco Light plant, which also operates his cream separator, sausage grinder, washing machine and other machinery, and he sells the butter, through two Vincennes grocery stores, to special customers at a premium of from 5-8 cents per pound above No. 1 creamery butter. To help advertise his product Mr. Johnson has his own special cartons.

He also sells some of his buttermilk through the same grocery stores that handle his butter, and the skim-milk goes for feeding the calves and pigs on his farm. His cattle are fed some kind of legume hay along with silage and the Purdue 4-2-1 ration of concentrates, which is 4 pounds of crushed corn, 2 pounds of oats or bran and 1 pound of linseed and cottonseed meal.

Besides running a 480-acre farm, 180 of which he owns and the other 300 which he rents from a neighbor, Mr. Johnson finds time to take an interest in various activities of his community. He is superintendent of the Sunday School in the oldest protestant church in the state, and he is working with the Farm Bureau serving on the program committee for the coming year. His wife also takes a leading part in training the children for the Christmas entertainments and other events at the church.

In running his farm Mr. Johnson has the assistance of two hired men the year around, and he uses a 10-20 McCormick-Deering tractor. He is one of the few men who are able to go into a number of things on a large scale and yet make a success of them all.

* * *

My Apples—1926

(*From page 42*)

the heaviest crop ever produced, from an equal number of trees, in this district. In spite of this very heavy production the crop ran to desirable packing sizes, being mostly 4 and 4½ tier apples.

NOTE: The steady and consistent improvement that has taken place in this orchard, both in trees and fruitfulness, since Mr. Reed began the use of phosphate and potash fertilizers, is remarkable, and has come about chiefly, if not altogether, from their use in liberal quantities. It will be noted in connection with this that so far, little nitrogen has entered into his scheme of fertilizing. On being asked the reason for this he called attention to two of his King apple trees that in 1923 received an excessive application of chicken manure—the chief ingredient in chicken manure being nitrogen.

These trees, although they look well, do not color their fruit which remains green when ripe instead of assuming the beautiful red and yellow markings taken on by the others, even though they are receiving the same amounts of potash and phosphates that are supplied to the others. Although Mr. Reed believes in nitrogen and advocates its use he advises caution in regard to using it in excess.

Another matter that is well worthy of attention is the success he has met with in overcoming the loss of crop from rain damage, during the blossoming time, by the use of heavy applications of phos-

phoric acid and potash fertilizers as shown by the wonderful production of 60 trees of Gravenstein apples in 1925, as compared with the trees that had received only one-half the amount, and the production of his Rome Beauties in 1926 as compared with untreated orchards throughout the district. Mr. Reed spoke of his Rome Beauties only carrying from a 60 to 70 per cent crop, but judging from the load these trees were carrying on September 10, if this was only a 70 per cent crop, many growers, who may think their trees are doing well, are not getting 50 per cent crops even under the most favorable weather conditions.

Mr. Reed considers and undoubtedly rightly so that phosphoric acid used in abundance is the chief factor in enabling the trees to set a heavy crop of fruit in spite of injury from rain at blossoming time; although potash, through promoting the formation of healthy sturdy bloom buds, undoubtedly plays an important part as well.

Another very noticeable feature, which Mr. Reed attributes to the liberal amount of potash used, is the greatly improved quality of all varieties of apples produced on his place. It is doubtful if this quality can be excelled anywhere; the fruit being crispy, firm, beautifully colored, unusually fine flavored, sweet and juicy.

From the valuable results obtained, from the use of fertilizers on this orchard, we hope Mr. Reed will not fail to give us a report on his next crop and trust it will be equally good.—B. E. Maynard.

* * *

Try this on your piano. Get up when you wake up and wake up when you get up.—*Sickle and Sheaf.*

They Clip Every Weed

Acme Tractor Models sweep close to the trees without doing the slightest damage. When fitted with our XL (extra-long) Coulters, they clip every weed and mulch the entire surface.

Our "Acme" Tractor Models won't hurt the branches or break off the fruit

"Acme"
Coulter Harrow

We also make a full line of horse or mule drawn "Acmes" for orchard, grove and field tillage. These have flexible sections and interchangeable Coulters which can be renewed at small cost when worn.

A request will bring free booklets

NASH-ACME HARROW COMPANY
947 Drexel Bldg., Philadelphia, Pa.

"The Coulters Do the Work"

Mind

(*From page 4*)

to arise and walk straight ahead to the opposite wall. The mind instructs the legs. Wouldn't we be surprised if the legs *refused*—and walked to the left against the desires of the brain?

I use "brain" and "mind" here interchangeably, not because I do not realize the distinction that in voluminous books men of science have drawn between the two, but because their distinction means nothing. It is a *conjecture* at best.

Actually we know as little about the brain and mind as we know about electricity. And Thomas A. Edison, after fifty years of experimentation and study, says that he can *control* and *utilize* the force called electricity, but he does not yet know what it is, where it comes from nor where it goes when it disappears!

So far in the advance of civilization men have laid great stress on the chemical, the scientific, the mechanical. Great forward strides have been the result of this concentrated effort.

I predict that the great strides of the next century will come from explorations into the mind. And I base that prediction solely on the fact that in the mind lies the vastest unexplored region left in our world.

I realize that to merely set down such a sweeping statement is not only to involve myself in a vast correspondence with disputing readers, but to automatically classify myself with the man who, in 1890, said "men would never fly"!

In a few paragraphs to record a miniature "Outline of Progress" is difficult, but I believe that this rough classification will suffice to make clear my point:

In the realm of *physical discovery* man has explored and mapped almost all existing land and water from the North Pole to the South Pole. He has isolated all but two of the elements of which that land and sea are composed. What is left *here* for discovery?

In the realm of *transmission* of himself, of his deeds, of news, pictures and sound, man now travels below the sea and on the sea at great speeds. He flies above the earth, races about on the earth and beneath its surface. Where else is there to go? He speaks across the air, by wire and without wires. He transmits news, pictures and sound instantly, anywhere. What else can be desired? With the announcement of "television"—seeing over distance without wires—and the motion picture in colors in the home, all that lies ahead are *improvements* in the mechanical perfection of these arts.

In the *manufacture of needs and luxuries* for personal comfort and enjoyment, man has made such strides that almost anything a king can demand is available. What more can we *make* and *use?*

In the *growing of food,* man has reached the stage of *economic* improvement. No *new* foods are presented, nor can there be many concocted in the future. Improvements, *yes,* in growing, distribution and preparation, *but nothing new may be expected.* Even the production of synthetic foods in the future would be but a change in nature's method of production.

In the *sciences* there are discoveries to be made that may revolutionize the lives of future generations, but they fall within certain groups: the securing of cheaper, better heat, either from the Sun or the bowels of the Earth; the development of power from the atom; the cooling of warm places mechanically and similar additional *material comforts.* But even these are but improvements on present methods.

In the *realm of the body* there are advancements to be made to be sure—the further control of certain ravaging diseases; the greater understanding of the action of mysterious glands; the lengthening of life.

Mainly, then, if these five paragraphs are near the truth, what remains is for the most part, to *improve*—not to make many new, basic changes; because *there remain few to make!*

But the mind! That great, almost unexplored, undiscovered abyss of wonderment! What greater field of activity could man ask than this? *Everything* there remains to be learned.

So little do we know about the mind as compared to our knowledge of other elements of nature! All but two of the ninety basic elements of this world have now been isolated by scientists—and men are hard at work to allocate the missing pair; but who can state with certainty what the *mind* is composed of?

As a result of the work of certain scientists, psychologists, behaviorists and neurologists, we are beginning to learn something about how the mind controls matter, how one man's mind may dominate another's, and how a series of outward events may influence and affect the reactions of one's nervous and mental systems.

HERE and there arise men who, after thoughtful consideration, put their minds to work, either to dominate other men, to think out plans on logical bases erected on known fundamentals, or to pry more successfully into the hidden wonders of our universe.

Two farmers—one uses brains, with brawn as servant; the other using brawn only. The first *plans, thinks, studies, fertilizes, diversifies*—and lets nature take her course. He works less, but produces more.

The other seemingly seeks to yank his crops up through the tough soil by main strength and exertion. No one can accuse him of being lazy. He is up at four, sweats all day, and throws himself down for his rest at nine or ten at night. He never uses his brain or cultivates his mind. He not only fails to *project* ideas of his own but he *rejects* those of thinkers and experimenters trying to help him.

His crops are small, his life hard, his comforts few; for brawn alone brings meager returns.

Failing to overcome by pure muscular effort the adversities which stubborn nature puts in his path, he becomes a complainer. To rant against this miserable world becomes his sole relaxation.

You can duplicate this contrast in every walk of life, and quickly discover for yourself the influence that *mind* exerts on what are presumed to be purely physical efforts.

Who has not seen the effects of a sudden shock of grief or joy on the mind of a man? Who has not himself experienced the destructive power of worry? Who today does not realize the dangerous and insidious influence of an "inferiority complex" which falls over that individual who has been much criticized, and which works slowly but surely to undermine and crumple his mind and unfit him for logical thought?

We may have riches, material comforts and physical health, but joy, happiness and love are *purely mental.* And as life is not worth living without these, it is wisdom on our part to pay stricter attention to our minds from which these blessings originate, and less to our physical and material possessions which are as sand in the boots or ashes in the mouth!

ONLY NOW SHE KNOWS

Yells from the nursery brought mother, who found the baby gleefully pulling small Tommy's curls.

"Never mind, darling," she comforted, "baby doesn't know it hurts."

Half an hour later wild shrieks from the baby made her run again to the nursery.

"Why, Tommy," she cried, "what is the matter with baby?"

"Nothing, muzzer—only now she knows!"—*Florida Grower.*

The part of an auto that causes more accidents than any other is the nut that holds the steering wheel.

CERTAINLY, MY DEAR ALPHONSE

A spinster living in a London suburb was shocked at the language used by two men repairing telegraph wires close to her house.

She wrote to the company on the matter and the foreman was asked to report.

"Me and Bill Fairweather were on this job," he said. "I was up on the telegraph pole, and accidentally let the hot lead fall on Bill. It went down his neck. Then he said: 'You really must be more careful, Harry.'" — Everybody's Magazine.

Something to Think About— "Even a fish wouldn't get caught if it kept its mouth shut."

DEFINITION OF A LADY

"Now, John," said the judge, "tell us why you insulted this lady."

"Well, y'r Honor, I picked this lady up in me cab and took her to where she wanted to go an' when she got out, she gave me the exact change and no more, an' I sez under my breath: 'You stingy ol' hen,' and she heard me."

"Perhaps, John, you can tell us just what is your idea of a lady."

"Well, y'r Honor, I picked up a lady the other day an' took her to her distination an' she gave me a five-dollar bill an' me, bein' an honest man, I reaches fur me change, but sez she: 'Aw, t'hell with the change, go buy yourself a shot o' gin.' Now, that's what I considers a lady."—*Brown Jug.*

A negro mammy had a family of well-behaved boys, one day her mistress asked: "Sally, how do you raise your boys so well?"

"Ah'll tell you, missus," answered Sally. "Ah raise dem wid a barrel stave and Ah raises 'em frequent!"

AN EXCELLENT REASON

"Is your mother in, sonny," inquired the new minister as he stopped at the home of one of his members on his first round of pastoral calls.

"Betcha life," replied Willy—"Do you 'spose I'd be out her mowin' the lawn if she wasn't?"

Printed in U.S.A.

Approved . . .

by Experiment Stations, Agricultural Colleges and Other Authorities

When farmers ask you what to do about fungous and bacterial diseases that cut down seed germination and yields, that impair the quality of the crop, that sweep away a whole season's profit—what can you tell them? The old type disinfectant—corrosive sublimate and formaldehyde often destroy more than they save. Federal and state Experiment Stations, as well as non-official investigators, have for years studied this problem. Finally Semesan was evolved and submitted to tests on a great many diseases. Time after time Experiment Stations, Agricultural Colleges, and growers proved conclusively that Semesan does all that the older disinfectants could not do, and avoids the old familiar dangers and obstacles.

A series of crop booklets have been prepared with the assistance of some of America's foremost agricultural chemists. They deal with actual results, tests, and reports of experiments. They have a rightful place in your library.

Send for complete set now.

E. I. DU PONT DE NEMOURS & CO., INC.
Dyestuffs Department, Sales Division
WILMINGTON, DELAWARE

DU PONT

How Much of the Milk Check is Yours?

IF you are spending most of your milk receipts to import feed you are giving away profits that should be yours.

By increasing and improving your own clover or alfalfa, you can make a big cut in your feed bill. Every dollar saved this way goes into your own pocket.

To make a good succulent hay crop requires only a small investment in the right kind of fertilizer and lime, where needed. Just like your horses, cows or chickens, clover or alfalfa have to be properly fed to do their best work.

If you use manure, you will need to add phosphoric acid and potash—two plant foods that alfalfa and clover especially need. Add enough of these to your manure and you will get much better results.

When the need for potash becomes acute, you will notice small white spots on your alfalfa and yellowish brown ones on your clover. But do not wait for these spots to appear. Give your hay a good supply of plant food, making sure that you include plenty of potash.

You'll get more and better hay, and the profit that you've been paying out in feed bills will be yours.

POTASH IMPORTING CORPORATION OF AMERICA
10 BRIDGE STREET DEPT. B.C. NEW YORK, N. Y.

Genuine German

POTASH